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ABSTRACT

This document contains selected papers from the 25th annual conference of the International Visual Literacy Association (IVLA). Topics addressed in the papers include the following: visual literacy; graphic information in research and education; evaluation criteria for instructional media; understanding symbols in business presentations; multimedia; image ethics; digital images; visual information strategies; screen design; color preference; deep viewing; mythological symbols; visual thinking skills; digital technologies; identifying visually gifted young children; representation of culture in children's picture books; adult learning; humorous visuals in computer-based instruction; virtual reality tools for learning; the impact of Channel One school newscasts; Civil War photography; technology and the art curriculum; and computer mediated instruction. Also included are bibliographies of IVLA publications from 1983-93. (JLB)

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VISUAL LITERACY in the Digital Age

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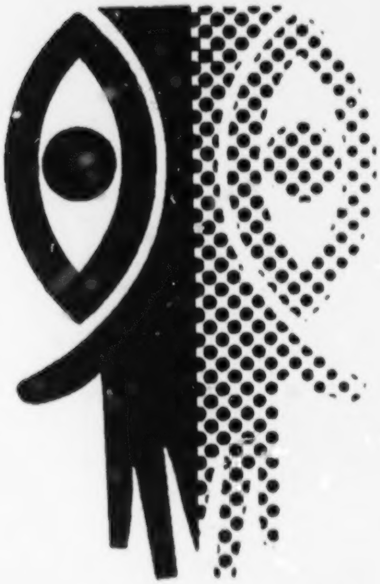

Selected Readings from the 25th Annual Conference of the International Visual Literacy Association

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Edited by
Darrell G. Beauchamp
Roberts A. Braden
Judy Clark Baca

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Every work, whether done in solitude or as part of a group, is a work of many. This book of readings is no different. Without the help of many people, this book would not have been possible. Also, this book might have been different without the many events which took place in between its conception and birth. Among the many personal events are a great many public ones, including the great blizzards of 93-94 (which found many of our authors without many of the essentials of life), the great floods in the Mid West (which soaked many of our members) and the great earthquake of 1994 (which shook some of our members out of bed). Somehow we still managed to get it together and get it out.

The editors would like to acknowledge the assistance of many individuals in the preparation of the book. In particular express our thanks to the people who participated in the proposal screening and conference activities: **Jim Sucy, Anna Sucy, Dick Ball, Tom Lightfoot, and Mike Krembal**. Since the papers in this volume are all edited versions of presentations at the Rochester IVLA conference, an enormous debt is owed to Conference Chairman **Bary Siegal** for his hard work and dedication to excellence and for providing the initial link to the authors.

Because we wanted every paper to be read and edited by four people, it was necessary for the three editors to seek editorial assistance. Once again, the members came through. In particular, we received wonderful input from four individuals without whom this whole thing would not have been possible. We have designated them as...

ASSOCIATE EDITORS
Beverly Braden
Bob Griffin
J. Mark Hunter
Dennis Pett

And finally, any large project puts strains on family, friends and co-workers. Our special thanks go out to **Jan, Cody, and Casey Beauchamp** (for patience), **Beverly Braden** (for wonderful care and support), **Linda Blatchley** (who re-taught word processing skills to one of the forgetful editors), **Eileen Kato** (for typing, making phone calls and tracking things down), **Sandra Dowd** (for helping print Mac papers), **Dana Brewer** (computer guru who always finds time to help those of us in need) and **Pris Hardin** (for playing long distance air traffic controller to a novice learning how to fly a Mac: "oops, what do you mean oops? and "Ok, now, do you see the little trashcan icon, don't get anywhere near that...").

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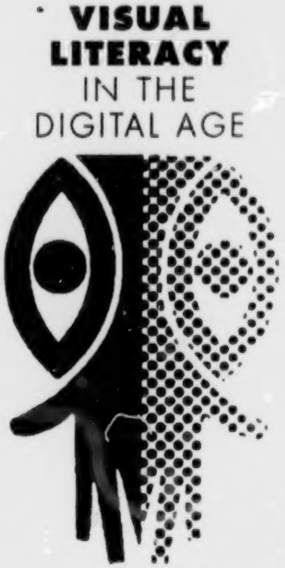

Cathy Chow

About the Cover

Artist Cathy Chow's award winning graphic design (prepared for the conference literature) serves as the basis for what we hope is a dynamic, yet elegantly simple cover. Ms. Chow's *"Visual Literacy in the Ditigal Age"* graphic won a national award for graphic design in the *"Creativity '93"* competition in *"Art Direction"* magazine.

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Twenty-Five Years of Visual Literacy Research

Roberts A. Braden

The visual literacy concept as an area of study has been plagued by an identity crisis from the outset. For one group of advocates a literal definition of the term has led to investigation of visual languages with a one-for-one analogy with the reading and writing aspects of verbal literacy. For others, more inclusive definitions have led to the study of visualization in all of its aspects of communication and education. The definitional controversy has been so much a part of the visual literacy scene that Cassidy and Knowlton wrote a major paper in 1983 entitled "Visual Literacy, a Failed Metaphor?," and in 1994 Moore and Dwyer included a chapter in their book titled "Visual Literacy: The Definition Problem." (Seels, 1994).

THEORETICAL FOUNDATIONS OF VISUAL LITERACY

The concept of visual literacy was crystallized by John Debes (Debes, 1968, 1969, 1970), but as Jonassen and Fork noted, "Visual literacy is eclectic in origin." (1975, p.7). Debes (1969) may or may not have coined the term visual literacy, but indeed he did provide its longest (and perhaps longest lasting) definition:

> Visual literacy refers to a group of vision competencies a human being can develop by seeing at the same time he has and integrates other sensory experiences. The development of these competencies is fundamental to normal human learning. When developed, they enable a visually literate person to discriminate and interpret the visible actions, objects, and/or symbols, natural or man made, that he encounters in his environment. Through the creative use of these competencies, he is able to communicate with others. Through the appreciative use of these competencies, he is able to comprehend and enjoy the masterworks of visual communication. (p.14)

In that early visual literacy work, "The Loom of Visual Literacy," Debes flirted with the idea of a visual language, and referred to the earlier work of Chomsky (1957) on syntactic structures and the work of Paul Wendt (1962) who had written about the language of pictures. Colin Turbayne, an early visual literacy theorist (1962, 1969, 1970a, 1970b) explored the syntax of visual language (1970b) and concluded that, "Unhappily the code of visual language is chaotic." (p.24). He was concerned that "Words are often ambiguous." (1970a, p.115) and that for an object or image to have language utility it must "...always suggest things in the same uniform way..." Turbayne, more than any other, laid the groundwork for an analogy of a visual language to verbal language. He wrote, "Just as a large part of learning to understand words consists in learning how to respond to them, so is it the case in learning how to see" (1970, p.125.). The notion that humans can be taught (thus learn) "how to see" has been central to visual literacists ever since.

Hortin has done the most intensive study of the theoretical foundations of visual literacy. His dissertation (Hortin, 1980a) was subtitled *An Investigation of the Research, Practices, and Theories* [of visual literacy]. In that document and subsequent writings (Hortin 1980b, 1994, Braden & Hortin 1982) he has agreed with Jonassen and Fork (1975) emphasizing the eclectic nature of the origins of the field of visual literacy and of the range of interests that find a common bond under that rubric. Like the pseudopod metaphor advanced by Debes (1970a) as a description of the parameters of visual literacy, Hortin has portrayed visual literacy as a confluence of thought--incorporating linguistics, art, psychology, philosophy, and more. Incidentally, the first researcher to characterize visual literacy as "a confluence of theories" was Johnson (1977). In his doctoral dissertation he wrote:

> I was disappointed to discover that visual literacy is really nothing more than a "confluence of theories," brought together to form a vague, unorganized concept that tries to explain the notion of "visual sequencing." (p.141)

Visual sequencing is only one narrow aspect of visual literacy as it is viewed today. The point of view of the researcher is critical, of course. Hortin was fascinated by the metaphor of parallel languages, and concentrated much of his focus upon the contributions of linguist Noam Chomsky (1957, 1964, 1968, and 1975). However, Hortin's primary research interest was with "visual thinking," and therefore his interpretation of what constituted a confluence of theories was much broader than that of Johnson whose field was the English language.

While Johnson was delving into the nature of visual literacy as an approach to English instruction, Hocking (1978) was exploring the wider issue of the parameters of visual literacy. His study at the University of Colorado sought to determine visual literacy goals. The paper by Braden and Hortin (1982) also explored the boundaries of the field.

Braden and Hortin also offered a shorter definition than Debes'. They refined Hortin's own earlier definition (Hortin, 1980) and came up with this definition::

> Visual literacy is the ability to understand and use images, including the ability to think, learn, and express oneself in terms of images. (p.169)

Seels (1994) in her chapter on the "visual literacy definition problem" uses the Braden Hortin definition in her glossary, giving current support to defining the field in broader terms. Many other attempts have been made to examine the nature of visual literacy and to define the concept. Notable among them are the work of Case-Gant (1973), Lamberski (1976), Fork & Newhouse (1978), Sucy (1985), Sinatra (1988), Whiteside & Whiteside (1988), and the participants at the Twenty-second Annual Lake Okoboji Educational Media Leadership Conference (Cureton & Cochran, 1976).

A host of theories and diverging areas of specialization emerged in the dozen years immediately after the visual literacy movement was set in motion. Braden and Hortin (1982, p. 164) compiled a short list:

> Some of the theories have dealt with: **visual languaging** (e.g., Ausburn & Ausburn, 1978; Debes, 1972; 1974: Turbayne, 1970b), **visual thinking** (e.g., Arnheim, 1969; Haber, 1970; Wileman, 1980), **visual learning** (e.g., Dwyer, 1978, Jonassen & Fork, 1978; Randhawa, Back, & Meyers, 1977), **hemispheric lateralization of the brain** (e.g., Bogen, 1979; Ragan, 1977; Sperry, 1973), **mental imagery** (e.g., Fleming, 1977; Kosslyn & Pomerantz, 1977; Pylyshyn, 1973), **levels of abstraction** (e.g., Clark & Clark, 1976; Clark, 1978), **cultural interaction** (Cochran, Younghouse, Sorflaten & Molek, 1980), and the **interactive theories** dealing with **symbol systems** and **dual coding** (e.g., Levie, 1978; Levie & Levie,

1975; Paivio, 1971, 1975, 1983; Salomon, 1972, 1979). [Note: the list was not meant to be all inclusive then, and certainly is incomplete another dozen years later.]

Baca (1990) did the most recent and most comprehensive study to date, a delphi study in which visual literacy professionals collectively helped identify what is and what is not a part of visual literacy. After years of quibbling about the nature of visual literacy, Baca found that "There is a great deal of agreement regarding the basic tenets of visual literacy among the scholars who study it" (p.74). Baca listed 186 accepted constructs of visual literacy. Those regarding definition included:

> Visual literacy refers to the use of visuals for the purposes of:
> communication
> thinking
> learning
> constructing meaning
> creative expression
> aesthetic enjoyment (p.65)

Earlier Baca and Braden (1990) had pointed out regarding the Braden & Hortin definition, that "even that definition fails to directly address design, creativity, and aesthetics as they apply to visualization." The delphi study acknowledged the additions.

The primary contribution of the Baca study was that it affirmed the broad scope of interests that are subsumed under the visual literacy umbrella. The study also provided an organizational scheme for categorizing the constructs of the field, but it did not identify all of the legs of Debes' pseudopod. That is one objective of this paper -- to organize the research of the field into the sub-fields of visual literacy. Such a framework will help to clarify the focus of future visual literacy research and will aid future fledgling researchers to select an area for study.

ESTABLISHING A VISUAL LITERACY RESEARCH AGENDA

In the past others have attempted in sundry ways to facilitate the research of the visual literacy area. The first authors to undertake the task of building a framework for visual literacy research were Spitzer and McNerny (1975). Their emphasis was upon operationally defining visual literacy so that we could proceed with research to support the operational definitions. An extensive study was made by Hocking to determine visual literacy goals which in turn could become the basis for research (Hocking, 1978). At about the same time Levie (1978) offered the field a prospectus for instructional research on visual literacy. The link of instruction to visual literacy was important, and the bulk of all visual literacy research has been done with learning and instruction in mind.

Lida Cochran and her associates took a more pragmatic approach. The Cochran team held seminars and meetings with aspiring visual literacists and examined the possible avenues of visual literacy research. A direction for the field was recommended, and possibilities were outlined for a broader audience in their *ECTJ* article (Cochran et al, 1980). For those with a greater interest in the linguistic aspects of visual literacy Hennis (1981) pointed out the need for research in the area of visual language. More recently, other authors have provided their conceptions of an agenda for visual literacy research. For example, Hartley (1987) addressed the role of print based research in an era when we must accommodate to changes brought about by the emergence of electronic text.

Gnizak and Girshman (1988) turned the entire process on its head. Rather than concern themselves with doing research about visual literacy they undertook an experiment in visualizing during the research process. They encouraged students to "define a pressing social problem in visual terms and thereby develop student abilities to analyze, to criticize, and finally to synthesize" (p.207). Levie (1987) lamented the fact that research on pictures was done in small topical islands, barely connected. He said that "an additional approach that brings together data and ideas from separate contexts could contribute much to our understanding of this pervasive, versatile mode of communication" (p.27). A list of Levie's "islands" is an outline of much of the research in visual literacy. His selected bibliography to accompany that list is broken into categories and is exceptional:

- Picture Perception (6 bibliography entries)
- Theoretical Approaches to Picture Perception (21 entries)
- Attention and Scanning (40 entries)
- Interpreting Figures and Pictorial Cues (40 entries)
- Perceiving Global Meaning (25 entries)
- Memory for Pictures (6 entries)
- Memory Models (25 entries)
- Recognition Memory (44 entries)
- Recall (20 entries)
- Other Types of Memory Research (27 entries)
- Learning and Cognition (7 entries)
- The Acquisition of Knowledge (48 entries)
- Problem solving and Visual Thinking (26 entries)
- Acquisition of Cognitive Skills (32 entries)
- Media Research (39 entries)
- Affective Responses to Pictures:
    - Arousal and Emotional Impact (17 entries)
    - Preferences (22 entries)
    - Attitudes (25 entries)
    - Aesthetic Responses (31 entries)

Obviously, many of the topics above are included in the research agendas of other fields. What is remarkable is that so much research in sundry fields has been found to have visual literacy implications.

VISUAL VOCABULARY

Although Levie's summary of the research on pictures covers much of the research relevant to visual literacy, Baca's study reminds us that the use of "visuals" touches other areas, including thinking and learning, and constructing meaning. To construct meaning from visuals implies that in some way the constructed meaning can be "read" by persons who view it. The notion that images can be "read" implies the existence of at least a rudimentary visual language which is made up of vocabulary components.

Study of visual representation has generally fallen into five distinct areas of inquiry: semiotics and film/video conventions; signs, symbols and icons; images and illustration (including the survey by Levie discussed above); multi-image; and graphic representation. Each of those areas has its own growing research literature.

Corcoran (1981) was one of the first to deal with **Semiotics and film/video conventions** in a way that is related to visual literacy. He pointed out that there are problems in the use of linguistic models or reader theories as they apply to reading the images of screen media. Others who have focused upon the relationship of Semiotics to visual literacy are Muffoletto (1982), Metallinos (1982), and Salomon (1982, 1983, 1984). The latter research by Salomon (1983, 1984) has focused upon demonstrating that it is much easier in terms of mental effort for an individual to view television than it is to read text. He characterized television as easy and print as tough. The implications for education are obvious.

The four other areas related to visual vocabulary have also been the subject of visual literacy researchers and theorists. For example, scholarship concerning **signs, symbols and icons** has been reported in the work of Salomon (1979), Griffin & Gibbs (1993), and Yeaman (1987). In the area of

images and illustration, including pictorial research, we find contributions by Alesandrini (1981, 1984), Duchastel (1978), Duchastel & Waller, (1979), Levie, (1978b, 1980), Levie & Lentz (1982), Petterson (1989, 1993), and the text on the basic research of the psychology of illustration by Willows & Houghton (1987). **Multi-image** is an area whose current popularity has spurred both articles in the popular press and research interest. In the later category are such works as those of Whiteside (1987), Didcoct, Ehlinger, Tierney, and Toler. Spread across several disciplines are many papers on **graphic representation** such as those of Jonassen, Beissner & Yacci (1993), Bertoline, Burton & Wiley (1992), Braden (1983), Whiteside & Whiteside (1988), Giffin (1989), Macdonald-Ross (1977a, 1977b, 1979), Moxley (1983), Pruisner (1992), Winn (1980, 1981, 1882, 1983, 1986, 1987), and Winn & Holiday (1982).

None of the research cited above has resulted in major new theory or in revelations of such a magnitude as to cause paradigm shift. Rather, the studies have resulted in the revelation of principles for image design and for instructional applications.

Four extraordinary books have been published which support research on illustration and graphic representation -- the two books by Houghton and Willows (1987) and the two books by Tufte. While the later are not research compendia, per se, Tufte's *The Visual Display of Quantitative Information* (1983) is scholarly, filled with principles drawn from the research, and is a definitive work on the subject. In a like manner, Tufte's *Envisioning Information* (1990) is a comprehensive, scholarly work that is a definitive book on how to use illustrations in support of concepts.

VISUAL LEARNING / VISUAL TEACHING

The visual literacy movement has been tied to the field of education from the outset. As noted earlier, Levie (1978) set a research agenda which had its focus upon learning and cognition. Prior to that Dwyer (1972) wrote his *Guide for Improving Visualized Instruction* which made widely known that he and his associates had been involved in a series of related experimental studies employing similar instructional materials since 1965. That program of ongoing research came to be known as the Program of Systematic Evaluation (PSE), and the 1972 report covered the results of the first phase of that program. The second phase was reported in Dwyer's 1978 book, *Strategies for Improving Visual Learning*. In 1987 Dwyer edited a volume of more than thirty research papers selected from the then one hundred fifty odd PSE experiments (the number has since passed two hundred). Dwyer himself (1994) characterized the 1987 book as a report on phase three of PSE. No other body of research rivals in size or scope the PSE series of experiments. Recently summaries of the PSE research have been made available (Dwyer, Dwyer, & Canelos, 1989; Dwyer, 1994). The findings of PSE have resulted in dozens of principles for visualized instruction and for visual design. For example, here are three (of nearly forty) generalizations from Dwyer's latest overview (Dwyer, 1994):

- Boys and girls in the same grade level (high school) learn equally well from identical types of visual illustrations when they are used to complement oral instruction. [a finding from Phase 1 of PSE].
- The realism continuum for visual illustrations applied to externally paced instruction is not an effective predictor of learning efficiency of all types of educational objectives. An increase in the amount of realistic detail contained in an illustration will not produce a corresponding increase in the amount of information a student will acquire from it. [a finding from Phase 2 of PSE].

- Achievement is enhanced when embedded cueing strategies are integrated into computer based instruction. [a finding from Phase 3 of PSE].

Other areas of study associated with visual learning and visual teaching have included **realism studies** which are closely related to the PSE program in thrust, but not in method. For a sample of this area of inquiry readers are referred to Knowlton (1966), Levie (1978), Levie & Lentz (1982), Wileman (1980, 1993), and Braden & Beauchamp (1987). A number of authors have concentrated upon **perception and critical viewing skills** (Adams & Hamm, 1987; Baron, 1985, Finn, 1980; Hefzallah, 1986, 1987; Lloyd-Kolkin, 1982; Watkins et al, 1988; White, 1980). Still others have concerned themselves with **visual aesthetics** (Arnheim, 1979; Curtis, 1987; Barry, 1994). A small but dedicated group of scholars has investigated visuals and visualizing as functions of **learning strategies and learner styles** (Ausburn & Ausburn, 1978; Canelos, 1980, 1983; Dwyer & Moore, 1992; Moore, D.M. (1986); Moore & Dwyer, 1991; Moore & Bedient, 1986, Streibel, 1980; and Ragan, 1978). In 1991 Mike Moore reported the results of a program of eight research studies by himself and his students at Virginia Tech involving field dependence-independence and a variety of media attributes. That program of research continues.

While many individuals have shown an interest in teaching with visuals, only a few have chosen to explore the effects of both teaching with and testing with visuals. Most of the **visual testing** research has been done in conjunction with the PSE program (DeMelo, Sazbo, & Dwyer, 1981; F. Dwyer & DeMelo, 1983; Szabo, 1981; Szabo, F. Dwyer & DeMelo, 1981; DeMelo, Hermes and F. Dwyer, 1983; C. Dwyer, 1985, 1985; C. Dwyer & F. Dwyer, 1985). In general the results of that research are that visualized testing provides better assessment and strengthens retention from visualized instruction.

VISUAL THINKING

Visual thinking is the most abstract concept that draws attention from researchers of visual literacy. Arnheim (1969) was one of the first to use the term. His theory of visual thinking has dominated the later work of such popular writers as McKim (1972), Dondis (1973), and Paivio (1971, 1975). Hortin (1982a) stretched the concept to add the dimension of visual rehearsal as a strategy for employing visual thinking in the learning process, and introduced the concept of introspection (is that a form of metacognition?) to the discussion of visual thinking (Hortin 1982b). Hortin also looked at the ways we use imagery in our daily lives (1983), connections of mental imagery to instructional design (1984), and the use of both internal and external imagery as aids for problem solving (1985).

Closely linked to the concept of visual thinking is the act of **visualization**. No one would argue that humans lack the ability to visualize, but how we do it and other details of the act have been the subject both of conjecture and of research. Recent articles on the subject have been published by Shepard (1978), and Hortin & Bailey (1983).

THE VISUAL-VERBAL RELATIONSHIP

When visual literacy was coined as a term an early outcome was to suggest the existence or possibility of a visual language(s). From the beginning comparisons have been made as if by second nature. Once we began to compare the communication aspects of imagery with written language it was inevitable that the relationship between traditional verbal language and visuals would be explored. Sensory redundancy studies were one of the results of this natural progression of inquiry. Several researchers have explored the effects of visuals used alone and with written or spoken words. Some of the more interesting work along these lines has been done by Appelman, (1993), Duchastel (1978), Braden (1983), Fleming (1987), and Dwyer (1988). A general conclusion would be that visuals and verbal materials when used together are in most cases stronger message carriers than when either is used alone.

Another natural outgrowth of the "literacy" metaphor has been the level of interest by teachers of reading and researchers in the field of reading in the relationship of visual literacy to the teaching of reading. Mulcahy and Samuels (1987) have written an extensive history of the use of illustrations in American textbooks over the last three hundred years. They point out that only as printing technology has progressed has it been practical for publishers of textbooks to be concerned with semantic and syntactic text parallels between the illustration and the context to the text. Having the right images in the right places in a textbook is a concern that is as new as the visual literacy movement itself.

Scholars who have concerned themselves with visual literacy and reading include Sinatra (1987) who offered a technique to use pictures as tools to teach writing as well as reading, Haber & Haber (1981) whose primary interest was in the reading process, and Levie & Lentz (1982) who addressed the issue more directly as one of "pictures and prose."

VISIBLE LANGUAGE: TEXT AS VISUALS

The field of typography deals with the design and appearance of printed text. Typographical research has delved into such matters as readability of letterforms with resulting principles for using upper and lower case letters together, letter spacing, line length or column width, hyphenation, justified vs. unjustified margins, and so forth (e.g., Davenport & Smith, 1965; Waller, 1979; McLean, 1980). Some of that research applies to visual literacy and its application to instruction and to visual literacy has been made widely available to the field by Hartley (1978, 1985) and Jonassen (1982, 1985). Misanchuk (1992) has shown how those same principles apply to amateur typography -- desktop publishing. When visuals and verbal elements are used together they become symbiotic (Braden, 1982), and in some forms the words or letters themselves become the visual message.

CONCLUSIONS

The research and scholarly literature of the field of visual literacy is voluminous. The bibliography of Clemente and Bohlin (1990), available from Educational Technology Publications, is 37 pages in length, and contains about 400 entries from sources who by-and-large are not part of the visual literacy movement. Two bibliographies by Walker (1990 and elsewhere in this volume) contain entries from the IVLA books of readings for the past 12 years, totaling nearly 500 entries. The IVLA books are not widely disseminated, so they are in the process of being made available through ERIC.

There is, however, much research yet to be done. Those interested in finding a research topic would be well advised to consider Baca's (1990) list. "Visual literacy research.

- is needed to identify the learnable visual literacy skills
- is needed to identify the teachable visual literacy skills
- is needed to develop implementation of visual literacy constructs
- is needed to validate implementation of visual literacy constructs
- is needed to provide a rationale for visual literacy implementation in our

society

- is needed to provide a rationale for visual literacy implementation in our educational system
- is supplemented by research conducted in other fields, including psychology, education, learning, visual perception and eye movement studies, print literacy" (p.70)

Baca also lists a dozen or so other possible research options. As an eclectic field, visual literacy provides many avenues of investigation.

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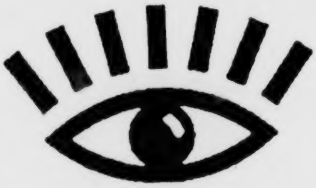
Fifteen Reasons to Study Visual Literacy

Ronald E. Sutton

Introduction

This presentation, *Fifteen Reasons to Study Visual Literacy*, is a report on a decade of teaching Visual Literacy in the School of Communication at The American University in Wash., D.C. The course was first taught in the Spring of 1982 and was designed for sophomores majoring in Visual Media (Film, Photography and Television). In 1989 Visual Literacy entered the General Education Program of American University as a Foundation Course in the Arts. Eight sections of 35 students are taught now annually.

There is a difference between just having your eyes open as you go through life and really seeing. Looking and learning go hand in hand and the need to see life in a discerning manner is essential.



Another name for this is Visual Literacy, a term celebrating its 25th anniversary. Visual Literacy is the awareness that comes with the appropriate development of our basic visual and aural competencies. It involves an awareness of who we are as individuals, an awareness that we are not alone...and an awareness that we communicate with one another, beyond speech with a variety of visual codes:

.....body language,
.....gesture,
.....print/graphic codes such as writing, etc.
.....painting,
.....sculpture,
.....architecture,
.....symbolic rituals,
.....theater,
.....costumes,
.....photographs,
.....films - old and new,
.....television,
.....and computer screens.

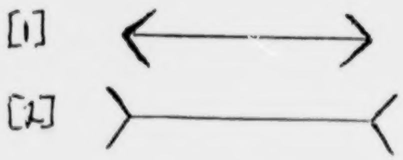
Visual Literacy is the awareness that the image (and sound) are a series of production decisions on the part of artists, producers and others.

All visual/aural communication is a construct created in a particular social, cultural and political context. There is meaning and power in Visual Literacy and there is humor and wit, joy and pleasure too.

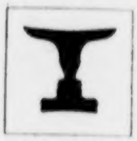
As our founding father, Jack Debes, stated, if we develop our "vision competencies" and use them in appreciative ways, we will "comprehend and enjoy the masterworks of visual communication." (fr. *The Loom of Visual Literacy*, 1969.)

Based on a decade of experience teaching Visual Literacy, here are my fifteen reasons for studying it. Add more of your own at the end of my list.

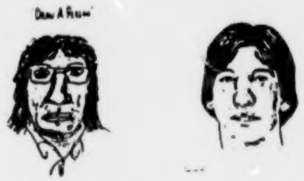
[1] PERCEPTION — To know that what you see is not always actually what is "out there."



You can see that line [1] is shorter than line [2] as perceived; but, if measured you will discover that the lines are of identical length. This is called the Mueller-Lyer optical illusion. Another one: is the figure below a pair of faces or a vase?



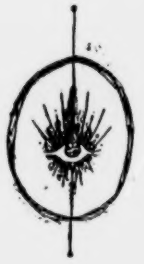
[2] DRAWING — To draw or sketch what you see as a means of recording it or sharing it with others.

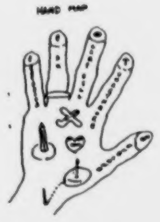


This is a before and after self portrait done almost ten years ago by Jim Lutz, after twelve weeks working through the Betty Edwards book, *Drawing on the Right Side of the Brain*. Jim is now President of his own Design company, **Arena Graphics,** which handles major accounts for stadiums such as Camden Yards, home of the Baltimore Oriole baseball team. He is a frequent speaker in my Visual Literacy class.

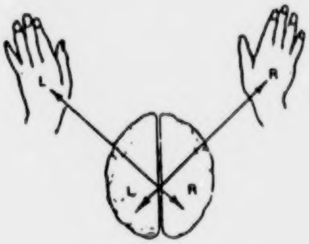
[3] **EXPRESSION** --- To express yourself in images as well as words. The ability to image oneself is often a gateway to self-understanding.

Below are two examples of self expression. The one one the left is personal logo done by a student some years ago in the class, and on the right is a more recent example of a hand map, my own, done with the class last year.



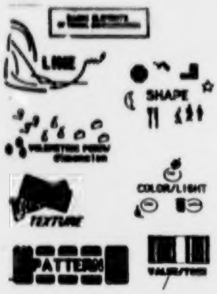


4] BRAIN AWARENESS — To learn you have a left and right brain mode that can facilitate your learning, managing, creativity, etc.



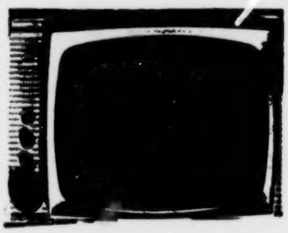
In class we use "brain power" test sheets, a video clip from the PBS series on *The Brain*, and a number of different exercises done in a drawing portfolio from the *Drawing on the Right Side of the Brain* to illustrate this phenomenon.

[5] **DESIGN ELEMENTS** --- To learn the basic elements of design including Dot, Line, Shape, Volumetric Form, Color, Value, Texture, Pattern, Structure, Space, Rhythm, etc. (from our current text by Barry Nemett, *Images, Objects, and Ideas: Viewing the Visual Arts*.



[6] **ANALYSIS/APPRECIATION** --- To learn to analyze and appreciate how all these elements are combined in...

...Drawings,
...Paintings,
...Sculpture,
...Architecture,
...Photographs,
...Films,
...and Television.



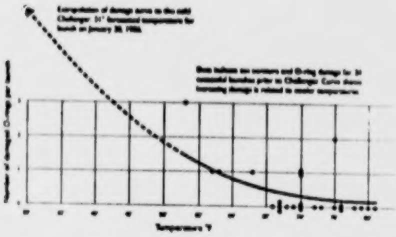
[7] **MUSEUMS** --- To enjoy visiting museums of all kinds and find fascinating the various styles of sculpture and architecture around the world and in one's home town.

[8] **CARTOONS** --- To understand cartoons, both political and cultural.

Herblock from the *Washington Post* and Gary Larson from his regular synicated strips and books have been main stays of the class for years.

THE FAR SIDE GARY LARSON

[9] **GRAPHICS** --- To know how to read and present visual information of all kinds, especially graphic information.



Above is a graph from the presentation Edward Tufte did in 1992 at our Annual Conference in Pittsburgh, PA, on *Imagery, Science and the Arts*. It would have saved the lives of those on the Challenger space shuttle had it been the one used to present data to those making the launch decision. This is an interesting area that I am still trying to integrate into my course.

[10] **PHOTOGRAPHY** --- To understand the history, development and importance of photography; and to take interesting photographs with existing cameras; and to learn how the electronic cameras of the future will alter our view of photographic imagery.

[11] **PHOTOTHERAPY** --- To learn how your family album can be a source of insight and healing of personal dysfunction.

This new aspect of photography was first introduced to me at the IVLA Conference in British Vancouver, Canada, in 1982. Both Judy Weiser, head of the Phototherapy Center in Vancouver, and Alan Etin, a therapist from Richmond, VA., have presented to my students on this area that proved useful in my own therapy.

[12] IMAGE MANIPULATION --- To learn not to trust photographs due to manipulation then and now.

This new area of personal research developed by my colleague, Professor Ann Zelle, and myself was the subject of presentations (IVLA 1990 Conference) and publications (*Investigating Visual Literacy*, Jan. 91; and *JVL*, Spr. '91; IVLA Symposium, Delphi, Greece, 1993 - in press for 1994.)

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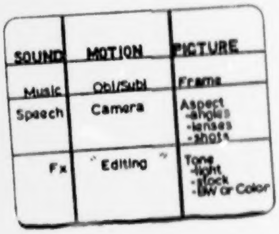
This presentation to the class involves slides, transparencies and video clips from the feature films *Zelig* and *Terminator 2: Judgement Day*.

[13] **FILM/VIDEO** --- To learn how to read a film; how film is like written language and how it is quite different than written language; to learn the basic elements of SOUND, MOTION, PICTURE; and to know something of the origins, development and special tricks of the Magic Lantern.

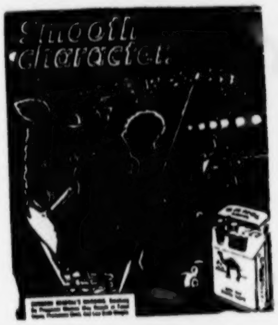


SOUND	MOTION	PICTURE
Music	Obj/Subj	Frame
Speech	Camera	Aspect -angles -lenses -shots
Fx	"Editing"	Tone -light -stock -BW or Color

[14] **DOCS ARE NOT REALITY** --- To learn that documentary films/videos are a 'creative treatment of actuality', not reality and not to be trusted.

Examples here are classic (*Olympia Diving Sequence*), as well as contemporary (*Survival Run*), and stress the problems of fidelity to truth that can come from reenacted sequences as well as the dangers of their use in the guise of actual historical events.

[15] **ADVERTISEMENTS** --- To recognize how advertisements affect us and stigmatize us, promoting often gender, racial, ethnic, class and age stereotypes, obviously or with suggestive subliminal psycho-sexual stimuli.



In class we study John Berger's *Ways of Seeing*, and look at Jean Kilbournes's *Still Killing Us Softly*, to stimulate our discussion and examination of this problem.

My own research on Subliminal reception (IVLA Conf. 1989; in *Perceptions of Visual Literacy)*, is presented.

It has been an exciting and provocative decade of teaching and these are my fifteen reasons for studying Visual Literacy.

What would you add?

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[My appreciation to Sara Sutton for help with the illustrations for this paper.]

A Theoretical Framework for Diagrams and Information Graphics in Research and Education

Pris Hardin

Pervasive Graphic Information

In a time labeled the information age, graphic information abounds. New technologies promote easier creation of graphic information, old formats emerge with new names, and designers explore fresh approaches to presenting information visually. Whether we call them information graphics or diagrams, two-dimensional maps of relationships present information in classrooms, board rooms, promotional displays, news reports, books and on TV screens, computer monitors and billboards.

Good diagrams promote understanding so well that their design elements are virtually transparent. As long as layouts contribute to the communicative power of diagrams, we take them for granted; diagram "readers" seldom mention the diagram itself unless its format or design elements prove to be confusing.

Even dictionaries make broad assumptions about the effectiveness of diagrams. One typical definition reads:

> 1. A plan, sketch, drawing or outline, not necessarily representational, designed to demonstrate or explain something or clarify the relationship existing between the parts of a whole.... 3. A chart or graph. (The *American Heritage Dictionary of the English Language* . 1970. p 363)

Most dictionaries surveyed present definitions asserting that diagrams clarify relationships and promote understanding. Objectively, we realize that clarification and understanding only occur in the mind of the diagram "reader" and not in the diagram. But diagram users, both creators and interpreters, need to know what makes some diagrams more effective in fostering clear communication. This paper suggests first a theoretical framework for diagram classification. Then, it proposes areas of investigation that should lead to more effective communication in some categories of diagrams.

Where Information Structure Meets Graphic Design

The link between information structure and diagram format is the vital core of a diagram's reason for being. A classification system for diagrams should consider both the structure of the information to be diagrammed and diagrammatic format.

In *How to Create High-impact Business Presentations* , Kupsh and Graves (1992) divide diagrams into two categories: "place" and "process." By acknowledging information structure, the authors move in a positive direction. The "place" category covers such divergent schema as maps, floor plans and organizational charts. The "process" category includes information like flow diagrams, and time lines. In actual practice, the place/process designations yield broad, sometimes overlapping, categories—is an organizational chart place or process? Which category includes graphs that present information plotted along two or more coordinates?

Kupsh and Graves treat diagrams addressing numerical orders, juxtaposed and plotted in a separate chapter on graphs. Yet, by definition, they are diagrams.

A complete classification system for diagrams must accommodate the full range of schematics; place, process and static numerical plots. In his introduction to *Diagraphics*, Nigel Holmes (Japan Creators' Association, 1986) addresses the role of numbers in graphs:

> "Unexplained numbers are not information. We mistakenly refer to the 'Information Explosion' in the world today. There is no information explosion—it's a numbers explosion, and it falls to designers to turn the numbers into useful information." (Wildbur, 1989, p 57)

A search of the literature for organizational categories for information structure and diagram layout yields two continua that may be adapted to fit the need. From statistical literature comes a continuum of information structure ranging from equidistant interval through ordinal to nominal. From cultural anthropology (Hall, 1959) comes another three-part continuum running from technical through formal to informal for use in categorizing diagram formats and design devices. In Figure 1, the two continua run parallel—categories of information structure appear along the upper horizontal coordinate and categories of layout and design along the lower, horizontal coordinate. The left-most pair of categories—equidistant interval and technical carry definitions that yield a neatly defined border between them and the remaining categories to the right. The definitions of ordinal and nominal also yield a clear demarcation. However, the boundary between formal and informal is more of a continuum. Hence a breakdown in neat, enclosed regions and the introduction of a less explicit transition. Vertical placement represents the extent to which all the details within a diagrammatic array conform to its place on the horizontal continua—diagrams with the most homogeneous treatment of data appear toward the top of the field; those with mixed approaches to information presentation fit into the matrix farther down the image.

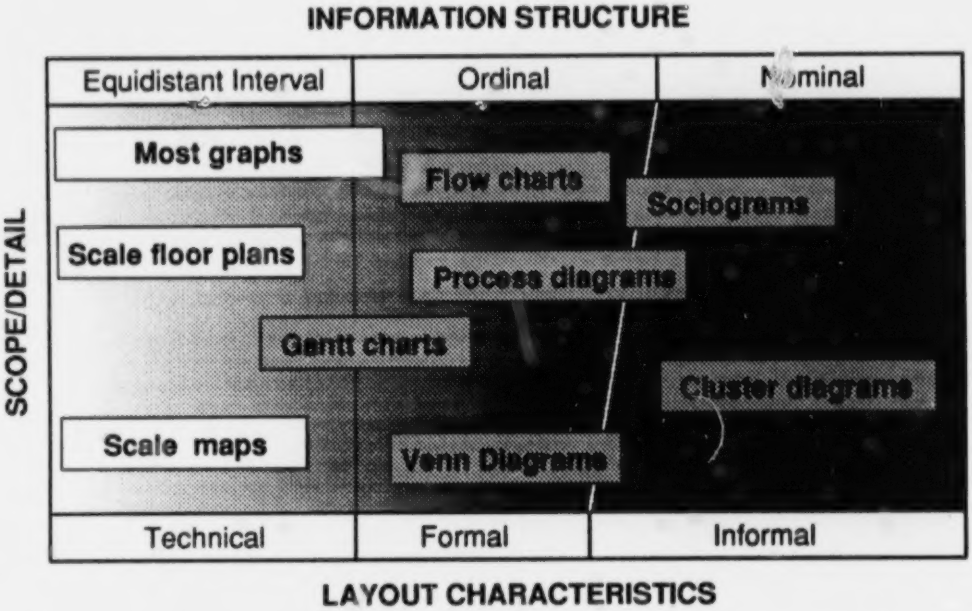
INFORMATION STRUCTURE
Equidistant Interval
Ordinal
Nominal
SCOPE/DETAIL
Most graphs
Flow charts
Sociograms
Scale floor plans
Process diagrams
Gantt charts
Cluster diagrams
Scale maps
Venn Diagrams
Technical
Formal
Informal
LAYOUT CHARACTERISTICS

Figure 1 – A schema presenting two, correlated continua along the x-axis. The field encompasses all information graphics.

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A brief clarification of how the categories of terms work together follows.

Equidistant Interval/technical Diagrams

Equidistant interval data, information that conforms to diagrammatic arrays, must have a minimum of two coordinates (x, y and sometimes z); these diagrams must conform to constraints of an interval scale (Figure 2). The literature defining accepted procedures is easily identified; violations of the published rules constitute a "wrong" diagram. This is a fundamental trait of Edward Hall's definition of technical norms. That is, we can readily identify rules for plotting and presenting such information as graphs, floor plans and maps. Peter Wildbur (1989, p. 46) cites such a rule when presenting a 19th century graph by William Playfair that omits 20 years of relevant data. Today, he asserts, we would "hardly accept" the omission. William was not playing fair!

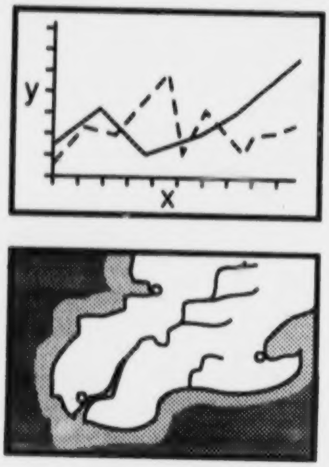

Figure 2 – Samples of equidistant interval/technical diagrams.

Ordinal/formal Diagrams

Ordinal/formal diagrams display information that has sequential structure along at least one coordinate. Ordinal in nature, the scale of a time line or flow chart along one continuum may vary from segment to segment within the diagram (Figure 3).

The rules governing design of ordinal/formal diagrams are less explicit than those governing equidistant interval graphs, maps and drawings. Violations of the rules for ordinal/formal diagrams only occur when a node or entity is placed out of proper sequence in relation to other nodes or when linkages draw untrue connections between nodes. When readers of ordinal/formal diagrams locate an error in diagram construction, they are able explain how to correct the error. The "formal" designation connotes knowledge that we learn in organized training situations—at home, at school, in our work place; knowledge for which we can state structural and formatting guidelines. Hierarchical charts, flow diagrams and process schemata fall into this category. Sequential information usually translates into an overall directionality in diagram layout. Diagrammers can agree upon a starting point for an ordinal/formal diagram.

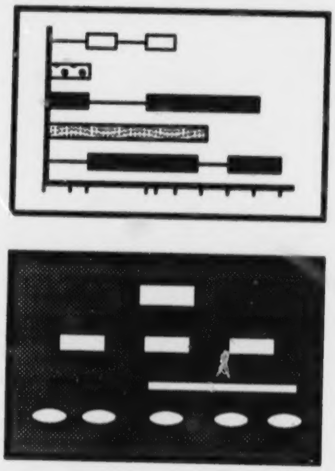

Figure 3 – Samples of ordinal/formal diagrams.

Nominal/informal Diagrams

As maps of relationships, nominal/informal diagrams feature multiple directions and reveal connections in the form of proximity, overlapping and networks or webs. Successful placement of nodes and connectors encodes intensity of relationship and relative importance. Temporal, sequential factors may be present but they apply only to small segments of the network rather than to an overall, coordinated flow of information (Figure 4). Nominal/informal diagrams may be "readable" starting at any of several points in the network. Sociograms, cluster diagrams and brainstorming networks typically represent nominal information.

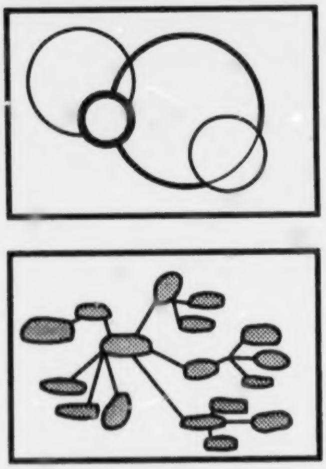

Figure 4 – Samples of nominal/informal diagrams.

The rules for constructing such arrays depend upon design devices like grouping, chunking, superimposition and partitioning. Users of nominal/informal diagrams recognize incorrect diagram features easily but may find difficulty agreeing on how to correct the problem; the rules for nominal/informal diagrams appear to be held intuitively. When the diagram is well designed, the message comes across clearly; both creators and users take the format and design devices for granted. By contrast, weak layouts obscure the information structure leaving interpreters puzzled. Reactions may be self-critical, "I seldom understand diagrams very well."

Defining Boundaries Between Categories

The definition of equidistant interval/technical arrays provides a neat, clean division from the rest of the horizontal continuum. Definitions of ordinal and nominal categories of information also yield an explicit break between the two. The formal/informal boundary is, however, clouded (Figure 5).

Categorization of diagram types from equidistant interval/technical through ordinal/formal to nominal/informal offers a broad perspective within which research and discussion of many important details of diagrammatic communication can take place. The many information types and diagram formats in current use have contributed to imprecise speculation and inappropriate comparisons; understanding the difference between "apples and oranges" and "apples and doorknobs" would avoid some serious errors. With vigorous discussion and some modification, the framework depicted in Figure 1 may evolve into a common ground for more precise investigation of diagrams—a powerful communication device.

Diagrams as Models of Thought

For the moment, consider diagrams that belong in the right half or two-thirds of the proposed schema. The farther the diagrammer/interpreter moves to the right along Figure 1's continuum, the more intuitive become the decisions regarding meaningful size and placement of nodes. The same is true for the rendering details and graphic style of connectors. (NOTE: Even in diagrams placed at the far right edge of the continuum, relationships indicated by connectors are either correct or incorrect. This is a fundamental factor separating diagrams, as statements of relationships, from art.)

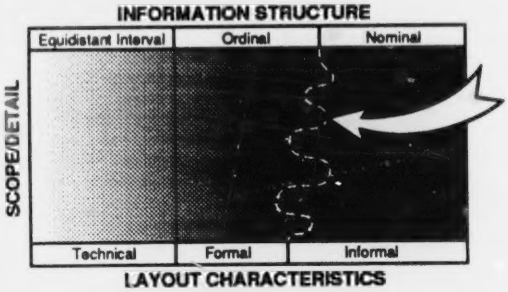

Figure 5 – The indeterminate edge between formal and informal diagram categories.

The greater the intuitive contribution, the harder it is to make logical, verbal explanations for diagram layout decisions. At the extreme right side of the continuum, cluster diagrams created by brainstormers may commence anywhere on the page and sprawl lopsidedly in any direction that intuition directs. But, evidence suggests that there are, indeed, commonly held rules guiding these intuitive decisions (Hardin, 1981). Advocacy for creating such diagrams as aids to learning, writing and organizing abounds (Buzan, 1974; Hardin, 1983; Rico, 1983).

The visual or graphic literacy surrounding diagrams deserves further investigation. Is the value of creating ordinal and nominal, free-layout diagrams limited only to the diagrammers themselves? Do the rules for layout change when diagrams present information to viewers who did not participate in the creation of the array? What layout and design devices make free-layout diagrams most meaningful to diagram interpreters?

Designers not only know how to incorporate diagrammatic layout and design devices into powerful diagrams, they trust in a visual literacy for diagrams among viewers.

> One of the spin-offs from the mass media is the increased exposure of the reader and viewer to a variety of sophisticated graphic treatments such as pictograms and diagrammatic techniques which means that the designer can assume a familiarity with certain forms and treatments, — a form of graphic literacy, which was not the case even a few years ago. (Wildbur, P., 1989, p 7)

As long as Wildbur's "certain forms and treatments" remain the province of designers, diagrams composed by non-designers will express only their untrained intuition.

Two remedies seem obvious. By investigating diagrammatic syntax, we can better prepare ourselves and those who come after us to communicate information through diagrams. Also, we should encourage non-designers to produce diagrams frequently on the theory that practice will increase skill. We do not expect language arts students to become better writers without practicing and critiquing writing; we should promote increased diagram production and critiquing, too.

Writing across the curriculum is a great idea—math and science teachers should be teaching the importance of writing skill in their fields. But we expect the language arts teacher to have the special know-how to evoke the greatest writing skill from students. Who then shall we look to for the special expertise to teach diagramming skills? How will these teachers learn what diagramming skills to teach or how to teach them?

A circular dilemma emerges. Whether we learn from practicing designers or from more formal research, we must know more about diagram dynamics in order to improve diagrammatic instruction. With better instruction, knowledgeable diagrammers will be available to conduct investigations to learn how diagrams work!

Research questions could begin by focusing upon the effectiveness of various design devices in the context of communicating various types of information. The underlying hypothesis for such research is that design format and selected design devices inform and influence understanding of the diagram; that diagrammers can avoid dissonance between information structure and layout strategies if they know more about how these two elements of a diagram interact.

- What types of arrows are most effective for various types of information? ...technical label pointers, directional flow in organizational charts, descriptions of flow paths in process schema, or links in cluster diagrams?
- What devices best show linkages in selected information categories? ...proximity, framed boxes, linear alignment, lines, arrows?
- Does overall thrust of diagram flow communicate a certain type of information to viewers? What are the messages communicated by differing points of origin; flows from left to right, diagonal or top to bottom; twisting, bending or radial paths?
- How do changes in layout flow communicate information within a diagram?

Investigators should not have to look far for tools with which to conduct diagram research. While serious studies of diagram effectiveness remain outside of the main stream of research, some efforts exist (Hardin, 1983). The advent of computer programs for creating diagrams should be one of the greatest aids to diagram research. Efforts to create such software date back to the earliest programming endeavors. It is hardly surprising that the first developments were in support of equidistant interval/technical diagrams. Gradually, software is emerging that ventures into the ordinal/formal and nominal/informal categories. Whatever the type of information supported by a computer-driven diagram generator, it's effectiveness will depend upon the versatility offered to diagrammers to choose from a broad range of diagram formats and design devices.

Arrow styles offer a good example of this problem. The choice of squared-off, symmetrical arrows as opposed to swooping, dynamic curved arrows ought to be related to the type of information the arrow serves. When rigid, blocky arrows are the only ones available to the diagram designer, they serve poorly in describing node connections involving speed, fluidity, uncertainty or intermittence. Yet, many diagrams employ the blocky, squared off arrows for poor reasons—the template only had one kind of arrow or the computer program only makes squared-off arrows.

Recent experience with *Inspiration,*™ a versatile software package designed for brainstorming, organizing and project/presentation management, suggests that it could become a vital tool for the conduct of diagram research.

Inspiration has already found enthusiastic support among educators. The company produces a special collection of diagrams and diagramming ideas contributed by teachers. This publication not only offers a broadly based array of lesson ideas but it exemplifies the basic premise of this paper—a better understanding of the visual literacy surrounding diagrams is needed to assure more powerful communication in the diagrammatic arena. *Inspiration's* adoption in the classroom endorses its suitability as a research tool; it is relatively easy to learn, offers an increasingly broad array of diagrammatic formats and design devices, and allows for several managerial controls that would enable researchers to adapt it to a research design.

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From Color Code to Color Cue: Remembering Graphic Information

Peggy A. P. Pruisner

"Like a richly colored flame whose bright tip draws upward, but is brushed by erring storm, then relentingly seeks the earth's dark form and buries its deep desires bit by bit."

With these words, the poet Hilda A. Dammirch (1948) figuratively recounted the memory of her mother's life and death. This image of existence leaves a visual impression in the mind's eye; the vivid, imagined colors of the flame leave a sensation in the observer's sensory system. Whether in the aesthetic expression of a poem, the brush stroke of a painter, or the graphic design of a textbook, the written text of a tabloid, or merely the onslaught of optical information that bombards the eye from the moment of awakening to the rest of sleep, 80% of all information perceived is of a visual nature. Because visual data consist primarily of shape data and color data, one can assume that 40% of all information perceived consists of information about color (Kueppers, 1982). Despite its significance as a source of information and as an aesthetic expression, students learn little about color in school. A minimum of direct instruction may include information about the color spectrum, the color circle, the laws of color mixing, and a few references to the uses of color in literature; however, instruction concerning the understanding and use of color in learning is largely missing from the curriculum of elementary and secondary schools, colleges and technical schools (Kueppers, 1982; Robinson, 1991).

This is the third study in a line of research to determine the impact of color on learning. The initial study (Pruisner, 1992), "The Effects of the Use of a Color Code in Graphic Presentation and Assessment on the Reader's Immediate Recall and Delayed Retention," evolved from the researcher's concern for the increasing requirements of literacy (Venezky, 1990); among those requirements is visual literacy, the ability to understand and make visual messages (Dondis, 1973). This line of research has focused on the potential for and reluctance of educators to manipulate and interact with the features or characteristics of graphics and to consider instruction aimed at developing visual literacy as essential across the curriculum (Robinson, 1991).

It is not so surprising that the curriculum lacks instruction in the understanding and use of color because research does not clearly guide instruction. From the noteworthy, classic studies of Dwyer and Lamberski (1982-83) has evolved a body of research based on the study of color-coded materials of the chambers of the heart. Subsequent studies have researched the effects of visual attributes on learning and made recommendations for practitioners (Dwyer 1978, 1987) although a limited number of graphic forms have been used. These studies have attempted to broaden the scope of research by using a unique graphic for which subjects have no prior schema. Additionally, the second study (Pruisner, 1993) attempted to further isolate color as applied to learning from graphics by eliminating the oral retelling of the myth used prior to the reading of the myth and accompanying the graphic in the first study. This third study utilized the same color-coded plan in preparing the graphic for presentation and assessment, but the code was not explained to the students. Consequently, the color appears as a cue rather than a code.

Methodology

Statement of the problem

In response to the contemporary reader's need to interpret graphics in our broad information environment, research stresses the need for and importance of well-designed graphics (Gerber, 1985; Kostelnick, 1988; Peterson, 1983). Empirical research needs to be conducted to determine the effects of the manipulation of graphic features on reading (Hartley, 1986), graphical comprehension (Peterson, 1983; Soderston, 1983), and instruction.

Research Questions

The following research questions were investigated in both the initial research in reference to a color code and in this subsequent study to a color cue:

1. Is there a significant interaction among the graphic presentation type (systematically color-cued or black/white), the graphic assessment type (systematically color-cued or black/white), and the time of testing (immediate recall or delayed retention) of verbal material?

2. Is there a significant interaction between the graphic presentation type (systematically color-cued or black/white) and the graphic assessment type (systematically color-cued or black/white) when immediate recall of verbal material is tested?

3. Is there a significant interaction between the graphic presentation type (systematically color-cued or black/white) and the graphic assessment type (systematically color-cued or black/white) when delayed retention of verbal material is tested?

4. Is there a significant difference in recall of verbal material between those given a systematically color-cued graphic presentation and those given a black/white graphic presentation?

5. Is there a significant difference in retention of verbal material between those given a systematically color-cued graphic presentation and those given a

black/white graphic presentation?

6. Is there a significant difference in recall of verbal material between those given a systematically color-cued graphic assessment and those given a black/white graphic assessment?

7. Is there a significant difference in retention of verbal material between those given a systematically color-cued graphic assessment and those given a black/white graphic assessment?

Research Design

An analysis of variance for repeated measures was used to test the hypotheses that significant interactions and differences would occur. The independent variables manipulated were the type of graphic presentation, the type of graphic assessment, and time of testing. The two presentation and assessment types were systematically color-cued and black/white, and the two times of testing included immediate recall and 2-week delayed retention. The dependent variable, recall/retention on the assessment graphic, was measured by achievement, the number of characters, actions, and explanations that were remembered and recorded as stated on a graphic presentation summarizing a little-known Norse myth. To accommodate three independent variables, with two levels each, a 2x2x2 (presentation x assessment x time of testing) factorial design with repeated measures on the final factor was used. Presentation type and assessment type were the between-subjects factors, and recall/retention was the within-subjects factor.

Subjects

The entire seventh-grade class from a Midwest junior high school with 563 students in grades 7-9 was used in this study. Each of nine seventh-grade homerooms, containing a total of 176 students, was randomly assigned to one of four treatment groups (adjusted $\underline{n} = 25$).

Treatment Groups

The four treatment groups received the following:

1. Color-cued presentation, color-cued assessment
2. Color-cued presentation, black/white assessment
3. Black/white presentation, color-cued assessment
4. Black/white presentation, black/white assessment.

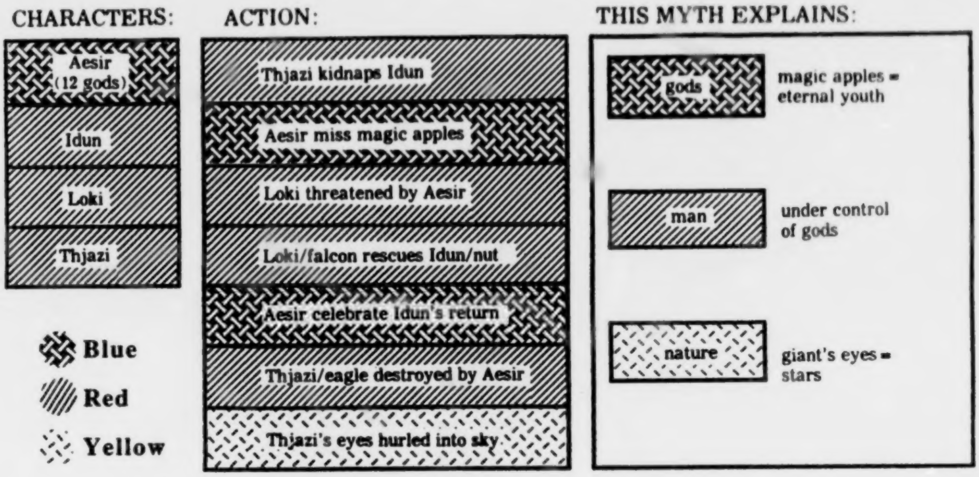
Procedure

During their homeroom session, all students received directions via audiotape; they then read and studied the graphic presentation in isolation. Finally, they demonstrated both immediate recall and 2-week delayed retention on the graphic assessment without the aid of the presentation graphic.

Materials

Following the directions, subjects were given the presentation graphic. The graphic design was the same on all presentations and assessments (see Figure 1). The form of the graphic was a unique design created by the researcher to prevent the subjects from having prior experience with the graphic.

Figure 1. Sample of graphic presentation indicating the use of color.


CHARACTERS:
Aesir (12 gods)
Idun
Loki
Thjazi
Blue
Red
Yellow
ACTION:
Thjazi kidnaps Idun
Aesir miss magic apples
Loki threatened by Aesir
Loki/falcon rescues Idun/nut
Aesir celebrate Idun's return
Thjazi/eagle destroyed by Aesir
Thjazi's eyes hurled into sky
THIS MYTH EXPLAINS:
gods
magic apples = eternal youth
man
under control of gods
nature
giant's eyes = stars

Scoring of the instrument

All assessments were scored by two raters to ensure accuracy. One point was given for each correct word or acceptable synonym. One point was given for each box or area where all words were written in order and spelled correctly. One point was given for each word or phrase that was placed in the correct box or area.

Results

Based on the results of the analysis of variance with the level of significance established at the .05 level, there was not a significant three-way interaction among the graphic presentation and the graphic assessment and the time of testing (see Table 1). The supporting evidence, the means and standard deviations for the four treatment groups, is graphically displayed in Table 2.

Table 1.

Repeated Measures Analysis of Variance, MANOVA Test Criteria and Exact F Statistics

	Value	F	Prob.	Sig.
Time x presentation	.99	.62	.67	NS
Time x assessment	.99	1.88	.17	NS
Time x presentation x assessment	.99	.01	.94	NS

Table 2.

Mean Performance at Recall and Retention for Each Treatment Group

Group	Time of Testing			
	Recall		Retention	
	M	SD	M	SD
Color presentation				
Color assessment	59.68	(15.70)	24.36	(20.00)
Black/white assessment	57.16	(17.83)	17.20	(16.05)
Black/white presentation				
Color assessment	44.24	(20.88)	11.20	(12.55)
Black/white assessment	51.81	(13.45)	14.60	(12.65)

Note. *n* = 25 for each group.

Furthermore, the analysis of variance for between subjects effects did not indicate the presence of a significant two-way interaction between presentation type and graphic assessment type. However, presentation alone was a significant factor (see Table 3).

Table 3.

Analysis of Variance, Tests of Hypotheses for Between Subjects Effects

Source of of variation	df	Sum of squares	Mean square	F	Prob.	Si
Presentation	1	4176.98	4176.98	10.18	.00	SIG
Assessment	1	5.12	5.12	.01	.91	NS
Presentation x Assessment	1	1331.28	1331.28	3.25	.07	NS

By reviewing the mean performance at recall and retention as a function of the type of presentation graphic, it can be determined that the preferred presentation type was color-cued (see Table 4).

Table 4.

Mean Performance at Recall and Retention as a Function of Type of Presentation Graphic

	Presentation Type	
	Color	Black/white
Recall	58.42	48.03
Retention	20.78	12.90

Note. n = 50 for each group.

Consequently, there was one major finding of this study: the important factor in enhancing performance appeared to be the presence of a systematic color cue in graphic presentation.

Recommendations for Practice

Because the use of color had an impact on the recall of verbal information presented in graphic form, the use of color in graphics should be considered when developing curriculum, planning instruction, and designing text. Designers, teachers, and students must let the purpose of the graphic determine the color code. The code should be thoughtfully created to enhance and extend schema development and facilitate learning and retention of verbal material and thereby promote literacy.

Implications for Future Research

To continue this line of research, it is recommended that future study include the following:

1. Research should be conducted to investigate the use of color by readers of varying ages and skill levels in remembering patterns in schemata. This research should include quantitative as well as qualitative, ethnographic research and case studies of readers considered to be at an expert level. The results would have implications for the graphic schema strategies we teach to students.

2. Research should include the use of color codes and color cues in other graphic presentations and assessments to see if similar results are produced using a variety of both new and familiar graphic presentations and assessments.

3. Research should include experimentation with colors, the quality characteristics of colors, and the number of colors coded and cued in graphic background and print to see what impact these variables have on immedicate recall and delayed retention.

4. Finally, there should be further research into the other features of graphic presentation and assessment to determine the comparative efficacy of other

graphic features in tapping and developing schemata. This research should indicate where other features in the graphic design are effective in increasing immediate recall and delayed retention of verbal material presented in graphic form.

The results of further research would provide valuable information for designers, teachers, and readers of materials at all levels of the learning spectrum.

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Tarnished Silver: Technology Images as History

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Background

In proposing a long-term study analyzing instructional media, we recognized that the selection and evaluation of media could be enhanced by a more theoretically grounded approach. Our goal became the eventual development of a sociocultural and local, context-sensitive base for selection/ evaluation guidance. Expectations of the interpretation included revelation of explicit and implicit ideological stereotypes and assumptions about our beliefs regarding teachers, teaching, classrooms and mediated education. Motivated by Bowers' discussion of the "current blindness" of the "conduit" view of software evaluation, we determined that an appropriate starting place was the expansion of the breadth of evaluation models primarily based on Gagné's events of instruction (1988, p. 47). In this manner we hope to include, among others, areas Bowers determined were neglected including language subjectivity and its influence on thought. Kerr provided the impetus for examination of evaluative methods drawn from sociology, policy sciences and anthropology to "shed new light on problems that have traditionally been approached using psychological research methods" (1985, p. 4).

Instrumental in synthesizing the purpose and direction of this analysis was Ellsworth's text, *The Ideology of Images in Educational Media* (1990). Her determination that until very recently, educational communications research was still focused on effectiveness and how learners gain from mediated messages provided sustenance to our goal of opening-up the evaluation model and applying the developed analysis directly to examine materials used to teach teachers about communications media and "technology." In this initial phase of our project we selected two 16mm films aimed at such purposes to guide our initial criterion development; *Audio Visual Materials in Teaching* (1956) and the later film, *Let Them Learn* (1967).

Theoretical Construct

The theoretical emphasis we have utilized for this analysis is derivative of primarily a social system model. It is not in conflict with systems models associated with education in general and instructional design specifically; all stem from an engineering model influenced by the biological organismic definition which recognizes environmental influences on the system. The systemic model should not be confused with the systems approach in education which is an empirical approach to the design and improvement of instruction based on a hierarchical/computational systems model. By investigating systems theory based models in other academic areas, we became disturbed by evaluation criterion which ignored larger aspects of impacting environment. Historically, we have recognized the implications of a number of contributing subsystems to the instructional system.

> The instructional system is a man-made system which has a dynamic interaction with its environment-teachers, learners, instructional resources, procedures, administrators, school board, parents, local community, government, and many other agencies. Furthermore, the instructional system is a system of interrelated parts working in conjunction with each other in order to accomplish a number of goals. (Saettler, 1968)

Buckley describes the appropriate system for analysis and directs attention to relationships.

> The kind of system we are interested in may be described generally as a complex of elements or components directly or indirectly related in a causal network, such that each component is related to at least some others in a more or less stable way within any particular period of time. The components may be relatively simple and stable, or complex and changing; they may vary in only one or two properties or take on may different states. The interrelations between them may be mutual or unidirectional, linear, non-linear or intermittent, and varying in degrees or causal efficacy or priority. The particular kinds of more or less stable interrelationships of components that become established at any time constitute the particular structure of the system at that time, thus achieving a kind of 'whole' with some degree of continuity and boundary. Also, we are mainly interested in systems within which some process is continually going on, including an interchange with an environment across the boundary. It is generally agreed that when we deal with the more open system with a highly flexible structure, the distinction between the boundaries and the environment becomes a more and more arbitrary matter, dependent on the purpose of the observer. (1967, p. 41)

By revisiting systems theory we could identify potential impacting factors contributing to the messages of our chosen texts at all levels of the system. We felt this would be a vital first step in the eventual creation of our long-term model. The system analysis will emphasize direct and indirect relationships and be able to assist in predicting the influence of any subsystem on the suprasystem. The model developed could therefore not only help explain what has occurred in educational media's past but also hopefully be used to make predictions about the future. In order to accomplish this, we begin by identifying the subsystems and propose the criterion which will define their relationships to one another. The development of system relationships criterion specifically targeted at 16mm educational film is the focus of this paper.

Anglin notes the difference between model and theory, stating that "if the educator is not also informed of the processes and use of the appropriate theory base interpreting the model, the skills required to apply the systematic (systemic) approach may remain undeveloped" (1991, p. 135). Guiding the development of this systems analysis are three important texts; Buckley's (1967), *Sociology and Modern Systems Theory*; Curtis' (1982), *Evolution or Extinction, The Choice Before Us: A Systems Approach to the Study of the Future* which proved instrumental in applying systems theory to future concerns in order to appreciate potential trends; and Banathy's (1987) chapter, "Instructional Systems Design" in R. M. Gagné's (Ed.), *Instructional Technology: Foundations* from which the bulk of our analysis is based. We intentionally included texts outside the educational theorists' usual fields to enhance our ability to contribute to a broader evaluation interpretation of our own academy's mediated messages as well as theoretical roots of systems analysis.

Four areas which will be addressed during this initial phase of model development include; 1) political/social influences, 2) demonstrated education theory, 3) demonstrated technology theory, and 4) filmic elements. This project is an analysis aimed at opening-up our evaluation criteria for broader understanding with the purpose of creating an enhanced analytical view capable of determining and interpreting multiple messages in our educational media.

A Systems-based Model

The idea of a systems-based model appealed to us for multiple reasons beyond its significance to our field's history. Buckley (1967) compared the more prominent social system models and noted several desirable aspects of the applied systems theory (p. 39). Recognizing that the systems analysis is suited for large complex systems he states that complex open systems are affected more by the experiences that come to the system than by the initial state of the system. Therefore, a systems-based analysis of film would include our experience of bringing relevant contributing cultural, educational, technological, and filmic evaluative criteria to our interpretation. Each of these areas could potentially contain a myriad of related theory and application. Further, it would demand a focus on the characteristics of the relationships between these complex components.

Among six compelling factors extrapolated by Buckley which contribute to the allure of social systems-based perspectives included in the examination of our chosen films are four particularly resonant concerns for this study. The applied modern systems theory is attractive to sociology and by extrapolation the study of the technology culture's teaching artifacts as "a synthetic approach where piecemeal analysis is not possible due to the intricate interrelationships of parts that cannot be treated out of context of the whole" (1986, p. 35) To film theorists this concept lays at the root of film form interpretation. Bordwell & Thompson define film form as a system consisting of "a unified set of related, interdependent elements" and take considerable care to delineate the "principles which help create the relationships among the parts" (1986, p. 35).

This commonality of purpose correlates nicely with two more of Buckley's observations which recognize the system's model as capable of developing a viewpoint that sees "in terms of information and communication nets" and recognizes the approach as "a study of *relations* rather than 'entities'" that allows the system to be perceived as "a flexible structure with many degrees of freedom."

Finally Buckley sees the systems approach as providing opportunity for the development of "an operationally definable, objective, non-anthropomorphic study of purposiveness, goal-seeking system behavior, symbolic cognitive processes, consciousness and self-awareness, and sociocultural emergence and dynamics in general" (1967, p. 39). Again, Bordwell & Thompson echo this ideal in their discussion on complexity criterion-based analysis when they argue that "complex films (not simply complicated films) are good insofar as they engage our perception on many levels, create a multiplicity of relations among many separate formal elements, and tend to create interesting formal patterns" (1986, p. 34).

We are recognizing that all films approached from the level of modern systems-based analysis can be evaluated in a developed interpretation of Bordwell & Thompson's "complex" standards by recognizing evaluative experiences as an enhancement of the system-based model which provides our reading with expanded exposition of formal elements and patterns. Bordwell & Thompson concur that form is "the overall system of relations that we perceive among the elements in the whole film" (1986, p. 24). This inclusion of the semiotic element of the index will hopefully allow formal elements to be opened up and related to other systems discussed allowing for revelation of complex relationships expressed in formal elements and patterns.

Banathy provided us with a systems-context model within the field of instructional technology which we felt was appropriately open to many of the influencing types of relationships and impacting systems we sought to explore. Following stated criteria, we used Banathy's educational systems model as a base upon which we advanced additional components by defining criterion related to 16mm educational film production which will allow us to explore:

1. The characteristics of the hierarchy of systems operating at various interconnected levels, their relationships, and mutual interdependencies;

2. The relationships, interactions, and information-matter energy exchanges between the system of interest and its environment;

3. The purposes and boundaries of the system of interests;

4. The dynamics of interactions among the components of the system and their relationship patterns;

5. The properties and characteristics that emerge at various system levels

as the result of systemic integration and synthesis; and

6. The behavior and change of the system, its environment, and its components through time. (1987, p.88)

Turning to Buckley (1967) we gleaned several useful terms which we then adapted to the purposes of this model for evaluation.

system
: a continuous, boundary-maintaining, variously related assembly of parts; aspects of system may change periodically or consistently without dissolution of system

relations
: shifting structure in relation of parts

structure
: systemic relationships

information
: a relationship between sets or ensembles of structured variety

Reviewing these terms clarifies what we will be seeking; relationships between the subsystems. How do they influence one another and can we identify emphasis in interactions that will assist in meaningful interpretation?

Proposed System Criterion for 16mm Educational Technology Films

POLITICAL/SOCIAL LEVEL:
Curriculum motivated vs. product driven influences

- economic support
  - government
  - capitalist
  - democratic mediation involvement (censorship/endorsement)
- prevalent evaluative practices
  - educational
  - technological
  - media literacy
- prevalent cultural values
  - gender
  - ethnic
  - economic
  - special populations

PROFESSIONAL PREPARATORY LEVEL:
Academic/certification technology emphasis for educators

- potentially applied theoretical information
  - medium appropriate evaluation criteria presented
  - filmic/semiotic
  - prevailing technological theory
  - prevailing educational theory
- use by professional preparatory educators

CAPITALIST EDUCATIONAL SUPPORT INDUSTRY LEVEL:
for-profit agencies

- film production values
  - technological developments
  - entertainment industry influences
- economic support
  - government
  - democratic mediation involvement (censorship/endorsement)
- technological development/expectations
- production encoding
  - filmic
  - prevailing technological theory
  - prevailing educational theory
  - prevailing socio/political theory

INSTITUTIONAL LEVEL:
system/state-wide administration

- prescribed curriculum
  - censorship/endorsement-socio/political and economic
  - theoretical support for film use as viable teaching method
  - administrative support for materials acquisition
  - assistance-support services including personnel and training
- evaluative organization
  - acquisitions
  - internal mechanisms

ADMINISTRATIVE LEVEL:
school

- prescribed curriculum
  - censorship-socio/political, administrative and economic
  - theoretical support for film use as viable teaching method
  - availability-administrative/economic support for materials acquisition
  - assistance-support services including personnel and training

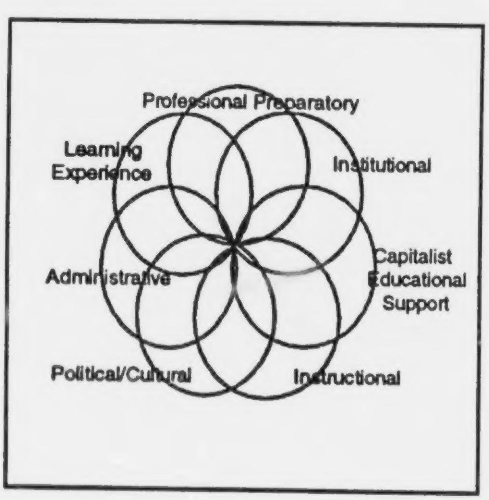
INSTRUCTIONAL LEVEL
active curriculum

- teacher external preparation
- expressed educational theoretic decoding
- film used as viable teaching method
- educational support
  - availability-institutional/for-profit support for acquisition
  - assistance-support services including personnel and internal training

LEARNING EXPERIENCE LEVEL
classroom

- Administrative support
  - assistance in acquisition
  - theoretical
  - socio-political
- Evaluative criteria
  - filmic/semiotic
  - educational/theoretical
  - technological/theoretical
  - socio-political
- Teaching style/presentation (external representativeness of internal truths)

Graphical Representation of Criterion Levels



We developed the above graphical representation of proposed criterion to illustrate the inter-relatedness of the levels. The textual format bothered us, since we recognized that many levels within our schemata interact at various points with many other levels. Linear or strictly hierarchical interpretations of our proposed criteria are incorrect.

Future Work

Our work on an enhanced model has just begun. Our proposed criterion will be formulated into a traditional systems model. To achieve this, we will characterize the organized complexity of the suprasystem which created these 16mm instructional vehicles by enumerating elements of inquiry provided by Banathy.

a. Clarify the levels that constitute the hierarchy and identify systems that operate at the various levels;
b. Designate the primary-system level in the hierarchy;
c. Clarify the key-systems entities around which the various systems are built;
d. Specify the purposes of these systems;
e. Specify their input, and
f. Output;
g. Designate control and decision-making authority at the various levels;
h. Display the relationships among the various systems;
i. Define the degree to which the systems are closed or open. (1987, pp. 95-96)

From this model, we will be able to begin the truly visual component of reading selected films in relationship to the model. We are convinced that this analysis will provide information which will aid in the development of our proposed model. It is a start in what promises to be an exciting and fruitful investigation of our past messages to educators. We strongly feel that examining our historical media will provide valuable insights into the future as well as clarify our past performance.

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Using Symbols in Business Presentations: How Well are they Understood?

Robert E. Griffin

Background For The Study

This study is an outgrowth of a previous study conducted by Griffin and Gibbs (1993). That study showed that a homogeneous audience of business people did not understand many common visual symbols. This study sought to replicate the earlier study and delve further into the study of symbols used in business. It was hypothesized that even though business people report participating in about one business presentation per month (Griffin, 1993), they are not, necessarily, visually literate when it comes to understanding symbols. The subjects used in this new study were first year Master's of Business Administration students enrolled at Penn State University.

Previous Research

There is an emerging body of research that says that symbols may not be the most efficient method of communication for the general population. Gustafson and Roettger (1991) reported significant differences in pictorial recognition resulting from picture context and complexity. Additionally, Dewar and Ellis (1977) and later Mackett-Stout and Dewar (1981) indicated that visual symbols do not make a complete language. Mackett-Stout and Dewar (1981) warned that the rapid proliferation of symbols has resulted in a variety of symbols that mean the same thing. All of this research was meant to warn visually minded people to be careful of relying too heavily on a visual language.

It should be noted that research exists to counter this philosophy. This pro-symbol evidence is cited by Tierney and King (1970) and Pettersson (1989).

In the Griffin and Gibbs (1993) study the researchers tested 48 black and white symbols for recognition. The study focused on a random collection of symbols including street signs, computer notation and other clip art drawings. The symbols were not necessarily those used in business presentations, they were simply readily available symbols in general use. The Griffin and Gibbs study had two major conclusions. First, symbols were not highly recognized by the North American subjects sampled in the first part of the study. Secondly, an international audience sampled in the second part of the study also performed poorly at identifying the symbols. The study implied that symbols are not an international language.

How This Study Was Conducted

The focus of this study was to measure the communicative power of business symbols with a business audience. A panel of three people was convened to select appropriate business symbols for the study. The panel selected the clip art collection from Software Publishing's Harvard Graphics business graphics software. This clip art was selected because it was readily available and fell into the category of named symbols. Named symbols are clip art items where the artist names each piece of clip art so that a user can easily identify it. The Harvard Graphics collection has a separate name assigned by the computer artist to each of the symbols included in its clip art library. It is this name that describes the symbolic intention of the artist. While the panel did not always agree with the name assigned by the computer artist, the name at least provided a base definition from which to begin the study. The fifteen symbols chosen are shown in Appendix A.

The questionnaire showed each of the symbols and provided a blank space for the respondent to write a freeform definition of the symbol's meaning. The respondents were asked to provide a one word or short answer for each symbol. Eighty eight subjects were used in the study. One questionnaire was discarded from the sample because the responses were inappropriate. The 88 questionnaires were tabulated by one person to control the classification of the answers. Responses were classified into one of five categories: PERFECT, CLOSE, ARENA, INAPPROPRIATE or NO RESPONSE.

Responses were categorized as PERFECT if the response exactly matched the name provided by the artist. In a few cases the PERFECT response was expanded to include very similar replies. For example, a broader range of definitions were used for the symbol semi shown in Figure 1.

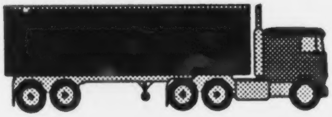


Figure 1
Semi

A response to this symbol was determined as PERFECT if the words tractor-trailer, 18 wheeler or semi were used. While the researcher originally intended to accept only the named answer semi, it was felt that the named title was not appropriate. Broader definitions were accepted for semi, tanker, and oil drum. All other symbols had to have the correct name.

The second classification was CLOSE. This was used if the answer given by the respondent was parallel to the named symbol. Let us use the thumbs up symbol, shown in Figure 2, to look at the Close definition.

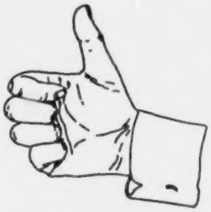


Figure 2
Thumbs up

Examples of the close definition for the thumbs up symbol were O.K., excellent, approval and good job.

The third classification used in the study was IN THE ARENA. Definitions in this category were responses that broadly described the symbol. For example, consider the Thumbs Up symbol shown in Figure 2. Responses that were considered in the arena were cool and winning. These responses were clearly skirting the symbol's meaning, they were close, but only in the arena. These definitions were not correct or communicative definitions.

A fourth class was called INAPPROPRIATE. Definitions put in this category were clearly seen as not correct. Again for the thumbs up symbol shown in Figure 2, inappropriate responses were: Fonz, Ryder Cup, hitchhike and help. It is hard to guess how respondents came up with these definitions. Many of the responses in this category left the researcher scratching his head.

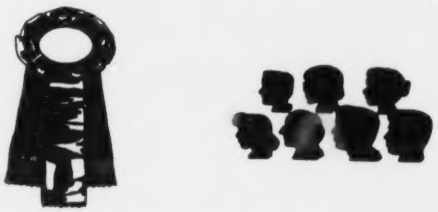
The final category was NO RESPONSE. This category was for questions that were left blank or had a ? for the response.

All of the category responses for the symbols are shown in Appendix A.

What Can Be Interpreted From The Study

Like many studies, this one poses more questions than it answers. However, a look at the symbols that were exceptionally difficult to understand, as well as those that were particularly easy, can help draw conclusions about relying on visual language. Let us first look at the symbols that caused difficulty in understanding.

Two symbols that were confusing to the audience are shown in Figure 3.



Award People

Figure 3
Two Confusing Symbols

Both the symbol titled award and the one titled people were difficult for the test subjects to interpret. The responses to these two symbols are shown in Figure 4 below.

Response	Award	People
Perfect	6	24
Close	31	24
Arena	19	37
Inappropriate	28	4
NR	4	0

Figure 4
Responses To The Award and People Symbol

Notice there is a similar distribution of responses in each classification category from Perfect through Inappropriate. While it is true that many subjects recognized the symbols correctly, it is also surprising that so many subjects could not identify the symbols. Some of the varied responses for the award symbol were: keyhole, bottle, can opener or funeral. The People symbol was viewed as: a jury, large nose, talking heads, and movie theater. Clearly the original artist never intended these meanings. These interpretations given to these two symbols indicate how confusing the meaning of symbols can be.

The most difficult symbol to interpret in the study was the monetary symbol Peseta. This symbol is shown in Figure 5.

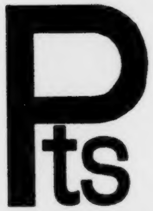
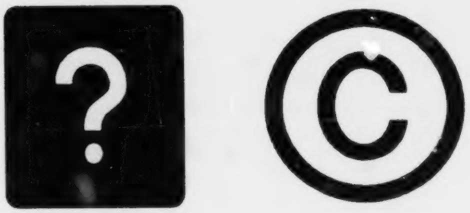


Figure 5
Peseta Symbol

The peseta is the basic monetary unit of Spain. While this symbol is not commonly known, the subjects in this population (business people) should have been aware of the symbol. Seeing this symbol out of the visual context of money possibly confused many people. Definitions given for this symbol included: pints, capitalization, Pittsburgh and points. In fact, points was the most popular response; it accounted for 70 of the 88 responses.

Two additional symbols also caused confusion. Most people in this research population should have recognized these two symbols. These are shown in Figure 6.



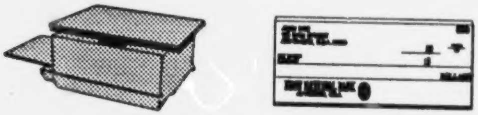
Information

Copyright

Figure 6
Two Additional Confusing Symbols

The information symbol and the copyright symbol are not strictly business symbols, but rather are informational signs. Non business people will encounter these symbols almost as often as business people. These commonly used symbols were recognized most of the time. However, when they were misidentified the definition was not even close to the intended meaning. The copyright symbol was misidentified 48 times and the information symbol was misidentified 38 times. This is higher than one would expect for this population. These are two symbols that the business population should be able to readily identify. Confusion over the copyright symbol was also noted in the Griffin and Gibbs (1993) study. The reason for this confusion is probably due to the large size of the symbol used in the study. A smaller version of the symbol may have been recognized.

The most consistently recognized symbols in the study were the Check and the Copier. These symbols are shown in Figure 7.



Copier Check

Figure 7
Best Recognized Symbols

The copier was recognized by 68 subjects while the check was recognized by 77 of the subjects. There appears to be enough detail on these symbols to make them easily to identify. There was little confusion in their interpretation, although it does seem strange that there was not 100% recognition in our test population.

Implications Of The Study

While this study was intended to look at business visuals only, the implications formed from this work are very similar to those in the 1993 Griffin and Gibbs study. First, it is obvious that people mistake or do not know the meaning of many symbols. Symbols do not have the power of a written language or the spoken word and therefore should not be relied on to convey accurate meaning. Clearly the confusion over the copyright symbol, information symbol and peseta symbol showed that these symbols fall far short of being considered as parts of a common language.

The second conclusion of this study also follows a conclusion reached in the earlier Griffin and Gibbs study. Subjects make rapid judgments about the meaning of symbols. They often do not look at the visual in great detail. Rather, they take a superficial look at the symbol and then make a determination of the meaning. Visual experts should not rely on symbols to convey in-depth meaning or ideas which are critical to an outcome. Symbols do not convey accurate meanings.

A third conclusion that can be drawn is that image perception is relative to the context in which it is viewed. The discrepancies over the copyright symbol and the information symbol appear to be caused by a context problem. When these symbols are removed from their normal context they are difficult to identify.

Confusion over the British pound symbol and the Spanish peseta is a context problem of a different sort. The business students who were the subjects of this study should have been informed about the international nature of business. But the students had difficulty recognizing international monetary symbols. If you examine the data for the pound and the peseta in Appendix A you will see that the students are obviously better informed about the symbol of the British monetary system than they are about the Spanish monetary system. The evidence of this is that the subjects recognized the British pound symbol far better than they recognized the symbol for the Spanish peseta. The peseta is not a major world trading currency like the British pound. This strong awareness of Britain is common in today's business schools.

What Is Next

The next step in this study is to measure recognition of these symbols with international audiences. Before doing so, some time will be spent refining the symbol set to choose the most appropriate business symbols from the current questionnaire. Once the symbol set is decided upon it will be tested in several international locations. It is the hope of the various researchers involved in this international study that we will be able to draw conclusions about the efficiency of using symbols in international business communication. There is a great deal more to learn.

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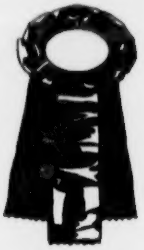
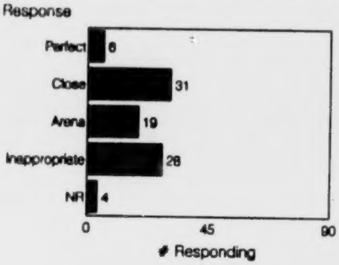
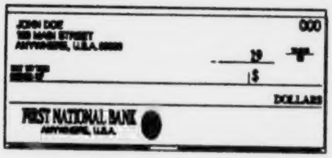
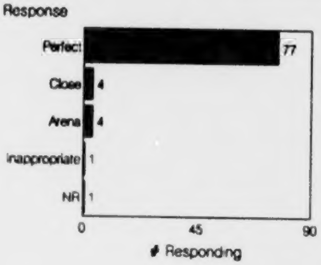
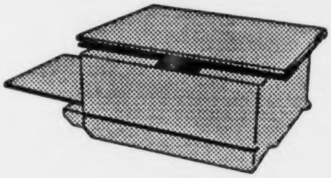
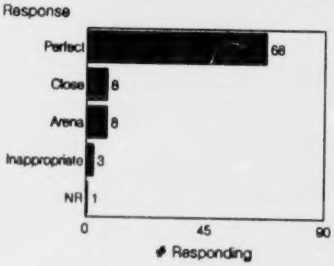
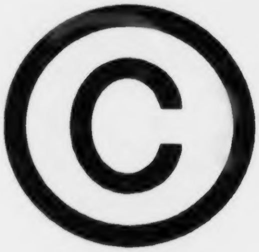
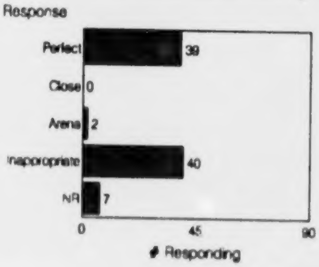
Appendix A

Symbol	Results
 **Award**	
 JOHN DOE 000 19 $ DOLLARS FIRST NATIONAL BANK **Check**	
 **Copier**	
 **Copyright**	

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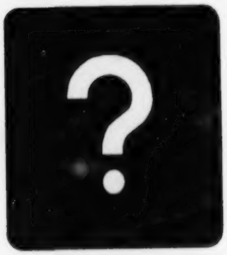
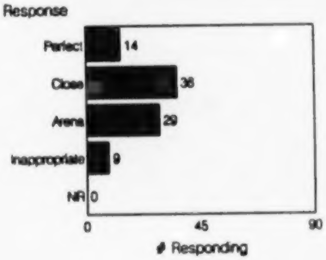
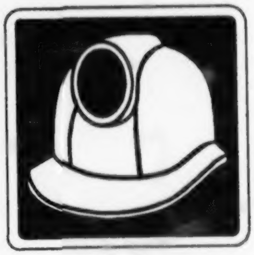
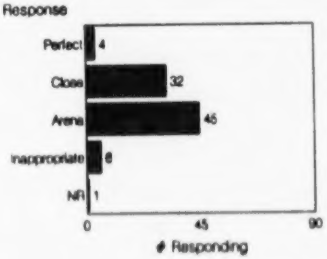
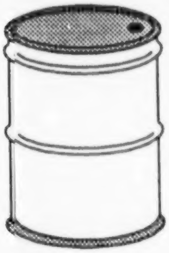
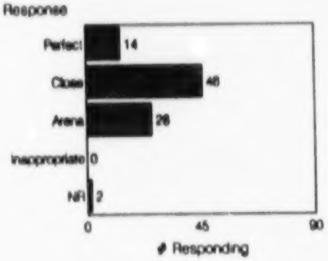
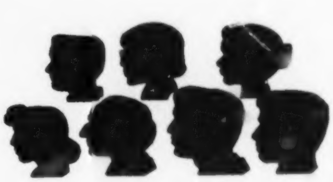
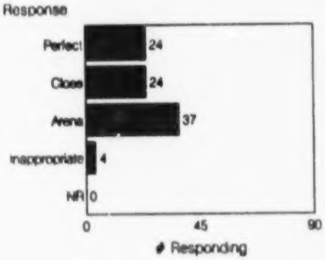
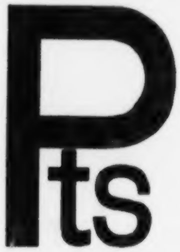
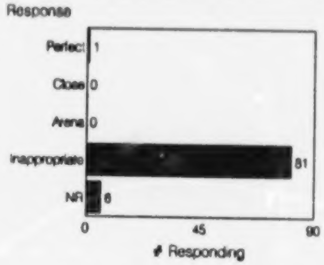
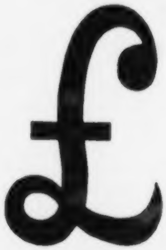
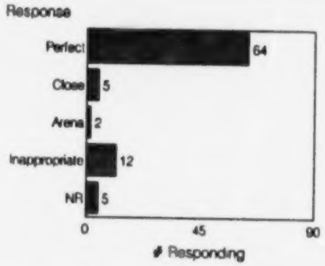
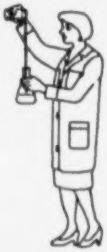
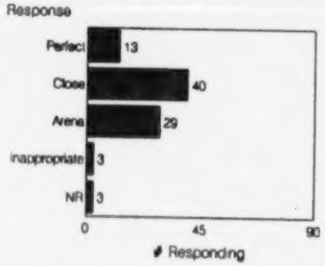
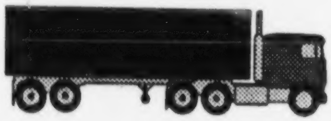
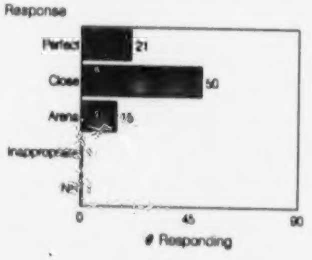
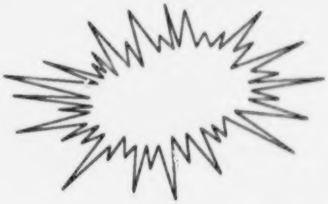
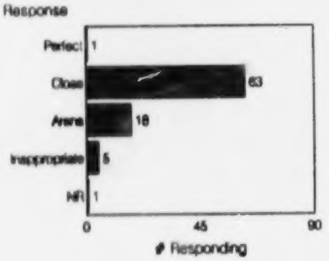
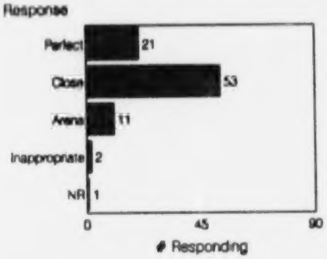
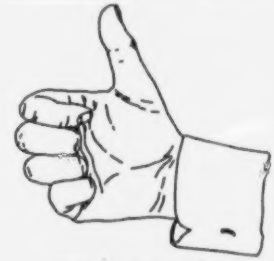
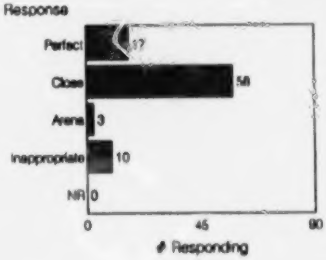
 **Information**	
 **Mining**	
 **Oil Drum**	
 **People**	

Symbol	Results
 **Peseta**	
 **Pound**	
 **Scientist**	
 **Semi**	

Symbol	Results
 **Star**	
 Tanker	
 **Thumbs Up**	

Multimedia: Promise, Reality and Future

David M.(Mike) Moore
Robert J. Myers
John K. Burton

It is difficult to find educational technology periodicals that fail to address some facet of hypermedia or multimedia-based systems. Educators and researchers continue to question the effectiveness of these new systems in learning environments. Proponents say multimedia allows learners to create, annotate, and link information from a variety of media such as text, full-motion video, animation, and sound (Meyrowitz, 1988). Advantages are said to include the possibility of combining artificial intelligence, cognitive science, and advanced technologies to provide a quantum jump in learning (Molnar, 1988). Ambron (1988) states that multimedia frees teachers from the constraints of textbooks and allows students to be active learners, controlling access to and manipulating vast quantities of information with a computer. Amthor (1991) states that multimedia arouses curiosity, promotes self-propulsion, and organizes knowledge by mirroring human activity.

Self-acknowledged visionaries proclaim the dawning of a new Renaissance, but perhaps ignore the basic processes of learning (Purcell & Myers, 1992). Reeves (cited in Sheehan, 1992) suggests that "interactive multimedia does not guarantee learning any more than the presence of a library on a campus or in a school guarantees learning" (p. 21). Reeves calls for a return to pedagogy and design which will support learners' interaction with multimedia.

Reservations abound. Some think it possible that learners will have such a trail-rich environment that it will be dysfunctional to the learning process, leaving the user disoriented (Conklin, 1987). Conklin suggests that it may be difficult to carry the mental load required to create, name, and keep track of links or trails. Heller (1990) adds that flagging commitment and unmotivated rambling may result. Bosco (1989) warns that multimedia can easily be used in trivial or ineffective ways, and it is too easy to get wrapped up in the technology as a thing unto itself. The penalty for this enthusiasm could involve a number of undesirable impacts. There may be a focus on the technology at the expense of instructional methodologies or a failure to design based on what we know about cognition and learning strategies.

This document's purpose is to review literature in multimedia research. We are interested both in what research says about the role of multimedia in instruction and whether extant research is sufficient and valid.

Multimedia Defined

The most commonly accepted definition of multimedia appears to support the concept of computer driven interactivity with the learner's ability to determine and control the sequence and content selection. Matchett and Elliott (1991) argue that "interactive multimedia" should include motion, voice plus data, text, graphic and still images. This definition permits multimedia to "absorb" the historically older and somewhat broader notion of hypermedia. As such, interactive video is a "high-bandwidth" source in the sense that a great deal of information, in many modes, or channels, are available at once (i.e., parallel fashion). DeBloois (1982) indicates that "it is important to realize that interactive video (multimedia) is not merely a merging of video and computer mediums; it is an entirely new media with characteristics quite unlike each of the composites" (p. 33).

The attraction of interactive multimedia is that it includes two of the more powerful educational technologies: the computer and video. Unlike some of the earlier linear technologies that allowed the user to remain passive, the new interactive programs not only allow viewers to become involved but demand it (Gleason, 1991). By doing so, these technologies, have closed the gap between some of the earlier theories of learner control and learning styles. Interactive multimedia allows the user to see, hear, and do. Through this mix of presentation techniques, interactive multimedia can appeal to learners who prefer to receive information by reading, those who learn best through hearing and those who prefer hands-on.

Using the Evidence to Evaluate Multimedia Programs

Does multimedia really work? It may be useful to differentiate between evaluation studies and research. Evaluation is practical and is concerned with how to improve a product or whether to buy/use a product. Studies that compare one program/media against another are primarily evaluations. Evaluation seeks to find programs that "work" more cheaply, efficiently, quickly, effectively, etc. Research, on the other hand, tends to be more concerned with testing theoretical concepts and constructs or, attempting to isolate variables to observe their contributions to a process or outcome. Having said this, we should point out that the terms evaluation and research are often used interchangeably in the fields of education and media.

Multimedia is a combination of many technologies, most notably the computer, which allows for true interaction. What information from previous research, relates to new multimedia programs? Strommen and Revelle (1990) stress the importance of existing research literature on computer usage for understanding the pragmatic requirements of developing interactive tasks in the multimedia programs that were developed at the Children's Television Workshop. This literature helped "take children's special needs into account and...(delineate) what the content of our interactive tasks should be and how those tasks should be structured" (p. 77-78).

Computer instructional software should be consistent with basic learning theories as should the instructional setting. Lillie, Hannum, and Stuck (1989) state that often, when computer instructional software is compared to specific learning theories, the research results are not consistent nor positive. However, using evidence based upon an extensive review of more than 600 studies concerning effective instruction, Lillie, Hannum, and Stuck (1989) identified a number of instructional principles that could be critical to the design, development, and effectiveness of computer programs for the classroom (and therefore, useful to multimedia design). The principles noted include the following:

1) Students will learn more when activities begin with a review of relevant information and skills as well as objectives and purpose of the lesson (Fortune, 1967; Kozma, 1982).

2) Students will learn more when they are able to handle tasks with high rates of success (Emmer, 1981; Kozma, 1982).

3) Students will learn more when provided with clear and concise directions and tasks (Emmer, 1981; Lillie, Hannum, & Stuck, 1989).

4) Students will learn more from computers when assignments and activities are monitored (Emmer, 1981, McConnell, 1977).

5) Students will learn more when computer based instruction provides timely and specific feedback of both correct and incorrect responses (Gersten, Carine, & Williams, 1982; Webb, 1982).

"While there may be no agreed-upon definition of interactivity, there is nonetheless wide agreement among researchers that user-computer interactions are cognitive in nature and that an effective interactive design must take into account the user's cognitive ability" (Strommen & Revelle, 1990). These lessons from research on computer assisted instruction (CAI) and the cognition aspects should be kept in mind when looking at the design of newer interactive multimedia technologies.

Smith (1987) indicated that there are three major sectors in our society that use, and conduct research on the effects of, interactive multimedia: the military, industry, and education. Educational use of multimedia programs is still limited and in most cases still experimental. Two multimedia formats (video-disc and videotape) are predominate in education. As you would expect, multimedia researchers are still debating their relative values and virtues (Smith, 1987). However, the marketplace may decide the winner and DVI technologies such as CD-ROM (McCarthy, 1993) and Quicktime™ may well settle the debate in a practical sense. Despite the short duration of multimedia's availability, Smith (1987) reported evidence for both the effectiveness and efficiency of the interactive media on learning.

Other researchers like Hannafin (1985) and Slee (1989) argue that there is little to support the contentions of the effectiveness of interactive media. They contend that little progress has been made since Clark (1983) argued that media in general have little substantial impact on learning. Hannafin (1985) asserts that while interactive technology, as noted earlier, offers interesting potential, interactive video differs little from the allied technology from either "learning or cognitive perspectives."

McNeil and Nelson (1991) in an extensive analysis of 10 years of interactive video research, indicated that interactive video can be an effective form of instruction and that their findings were similar to the earlier research results of computer-assisted instruction. However, many of their analyses were based upon studies that compared interactive methods versus more "traditional teaching approaches." These comparison studies often match a new medium such as interactive video with a rather poorly defined and operationalized "statement" called "traditional instruction." Researchers such as Clark (1983), argue that these types of studies have produced little useful outcomes. Kozma (1991) and Hannafin (1985) stress that research should instead concentrate on interactive features that maximize learning effectiveness. Studies, therefore, should not be directed at a specific medium, (i.e., interactive video), but on instructional methods and settings, the cognitive processes involved, the use of learning strategies, and how the content is structured (Jost, 1990).

Nevertheless, McNeil and Nelson (1991) in their analysis of 63 interactive video related studies related some potentially useful findings. These include:

1) Employing interactive video as a *supplement* to instruction was more effective than using interactive video as a *replacement* of traditional forms of instruction.

2) Using interactive video for group instruction was no different from using interactive video for individual instruction. Hofmeister et al. (1986) indicate that "the technologically-based, individual learning station must not be viewed as the ultimate delivery system for the public school" (p. 37).

3) Achievements of students using only videodisc were not different from students using videotape interactive based units. This conclusion should not be surprising considering Clark (1983) and Hannafin's (1985) warnings about using media comparison studies.

4) Learners who had *little or no control* over the instructional sequence of an instructional program *performed better* than students using interactive programs who had control over their instructional path. These findings may be further evidence "that interactive video is best accomplished when it is guided and structured as opposed to being entirely under the control of the

learner (McNeil & Nelson, 1991, p. 5).

Surprisingly, perhaps, learner controlled interactive programs produced the lowest achievement. These findings may raise questions concerning the practical value of the concept of interactivity. Existing developmental research can also play an important role in guiding the design of interactive (multimedia) programs for children. For example, the knowledge that children have less capacity in working memory than adults (Case, 1985) and are less able to chunk information, should alert multimedia designers that tasks and activities should not be complex nor have a large number of options (Strommen & Revelle, 1990).

Ragan, Boyce, Redwine, Savenye, and McMichael (1993) summarized the findings of seven major reviews of research on multimedia. The 139 reviews were from a variety of settings, but the majority concerned adults. Among their findings were:

1) Multimedia is at least as effective as conventional forms and has substantial cost benefits and efficiency.

2) Frequently, multimedia instruction is more effective than conventional instruction.

3) Multimedia is more efficient in terms of learning time than conventional instruction (30% savings).

Ragan et al. (1993) stated that they were unable to determine why multimedia was appreciably more effective than conventional instruction, but cautioned that it would be inappropriate to say that multimedia is always the most effective delivery system. They suggested that certain instructional design features appear to enhance the quality of multimedia instruction. Among them are higher levels of interactivity, program or advised learner control, integration of multimedia with other delivery forms, and structured rather than totally exploratory learning.

Smith, Hsu, Azzarello, and McMichael (1993) reviewed 28 group-based multimedia studies. They indicated that group-based multimedia can be as effective as individualized multimedia, and it can be as effective or more so than traditional forms of instruction. They also found that learners prefer group-based multimedia to individualized multimedia and traditional instruction. Smith et al. stated they were unable to predict which situations are appropriate for group-based multimedia and that it would be erroneous to state group-based multimedia is always superior to traditional instruction or individualized multimedia.

In a separate review of the research on learning from interactive videodisc, Cushall (1987) reported knowledge gains and time savings when compared to "traditional" lecture methods. Positive attitudes were reported towards learning from interactive video programs relative to other, "traditional" methods of instruction by both students and teachers. Younger children had the most positive attitude gains, (Cushall, 1987). At the same time, however, Cushall (1987) cautioned that few studies investigated the learning principles used in connection with interactive video. As do many others, Cushall (1987) indicated that, as a whole, most research so far on interactive video has *limited* generalizability and would be difficult to replicate.

Concerns Over Research

Many researchers such as Hannafin (1985), Smith (1987), and Clark (1983), and Reeves (1993) have also expressed concern over the existing research on the interactive multimedia platforms. Smith (1987) indicated that there are many existing procedures and guidelines for the development of interactive video available. However, as in the case of CAI, these guidelines are "experiential." They all appear to be commonsense development strategies depending upon "the designer's intuitions" about the instructional situation rather than upon any research based information or models. Bosco (1984) questions the value of "active learning" in many interactive programs. He asks: "Is the activity from the multimedia package actually involving the learner with the instruction, or is it merely automatic page turning, requiring no deep processing?" In addition, there appears to be an absence of analytical information on the effective use and *evaluation* of interactive programs. Nevertheless, Hannafin (1985) reports that while little research has been conducted, *some* appears to be favorable. However, "both instructional time and learning efficiency were found to be negatively correlated with increased interactivity, suggesting that additional learning under interactive video may be costly in required instructional time. Whether or not the gains associated with increased instructional time are worthwhile is unresolved" (p. 242).

In a 1993 critique of learner control research, Reeves, suggested that much CBI (a term he defines as a wide range of systems from tutorials to complex environments) research is pseudoscience. This is "because it fails to live up to theoretical, definitional, methodological, and/or analytic demands (p. 39) of the positivist research paradigm. Here are some of the flaws he discusses:

1) Williams' review indicates most research on learner control has been conducted using drill and practice or tutorial programs with little done on simulations or hypermedia (cited in Reeves, 1993).

2) Definitional problems: an ability to define exactly what "learner-control" means.

3) Theoretical problems: few studies have linked learner control issues with theoretical issues found in learning theory.

4) Methodological problems: treatments are too short and/or infrequent.

5) Studies often place students in contexts unrelated to their education, sacrificing relevance and increasing threats to validity and reliability.

Reeves opines that perhaps a moratorium should be called on the types of quantitative studies he reviewed until qualitative studies conduct "...extensive, in-depth efforts to observe human behavior in our field and relate the observations to meaningful learning theory that may later be susceptible to quantitative inquiry" (p. 44).

Suggestions For Research

Many practitioners developing and using interactive programs (and some researchers) have questioned the value of the existing research on interactive technologies. For one thing, little actual research has been conducted and what has been conducted has limited value. Practitioners and researchers alike are calling for a systematic research program that goes beyond the traditional comparison studies. McNeil and Nelson's (1991) summary findings of some 60 studies are an exception. Others like Grabowski and Pearson (1988), Slee (1989), Reeves (1986) and Kozma (1991) have made calls for conducting research on instructional strategies related to the specific attributes of the interactive medium. As early as 1985, Hannafin had made concrete proposals for future research into interactive technologies. He offered 12 propositions for further research that focus on the methods, the assumptions and the instructional strategies of the interactive technology rather than the technology itself. His research propositions included:

1) The more interactive the instruction, the greater the learning.

2) The type of interactivity affects the amount of learning.

3) Interactive video is appropriate for the full range of learners, content and types of learning tasks.

Hannafin (1985) contended that while some of his 12 propositions may be supported or refuted, the use of interactive video would thus be considered from an empirical base and not from the current intuition and assumptions as many are now considered.

An additional problem of research dealing with multimedia programs, according to Strommen and Revelle (1990), suggests that it is adult-oriented and non-developmental in nature. This is in no small part because it is expensive to develop and more likely to be designed for industry and military applications. Few, if any researchers, have considered "the ways in which adults and children may differ in their abilities to use computers" (p. 67). This concern also needs to be built into a program of research on multimedia.

The Bottom Line

What does the research say about multimedia and its interactive technologies? Unfortunately, not enough. The terms *multimedia* and *interactivity* are defined universally by neither the developers nor the researchers. Many of the current guidelines for the development of multimedia programs can be traced to just a few sources. One source is the behaviorist learning theory tradition of Thorndike and Skinner, the second is existing research investigating computer assisted instruction. The most prevalent sources however, are assumption, intuition, and (apparently) commonsense. In an extensive review of the literature, there appears to be too little useful research on multimedia. Quite frankly, with few exceptions there is *NOT* a body of research on the design, use, and value of multimedia systems. The few exceptions are the meta-analysis of some 60 studies of McNeil and Nelson (1991) and the work at the Children's Television Workshop (Strommen & Revelle, 1990). The lack of research concentrating on interactive features which maximize learning effectiveness has been noted by both practitioners and researchers alike. Specific programs of research have been suggested to fill these gaps, for example: Hannafin (1985), Kozma (1991) and others. Until these calls are taken seriously, multimedia development will have a less than adequate research base.

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Universal Pragmatics: A Critical Approach to Image Ethics

Robert L. Craig

Introduction: Visual Criticism

Visual communication has come under intense intellectual scrutiny during the last twenty years as scholars have sought to understand the role photographs, graphics and illustrations play in modern communication. The value of studying visual communication has been heightened by the development of inexpensive, easily operated, digital imaging hardware and software, which is altering the face of the visual professions.

Besides changing the way imagemakers work, the new technology puts the power to combine and manipulate images into the hands of those who heretofore lacked the finances or the handicraft skills needed to accomplish these tasks with such seeming naturalism.

Reaction to the new technology varies. In newsrooms, where the credibility of the photographic image underscores the objectivity of news, some argue that such technology has a limited role, if any at all.

Advertising photographers, of course, welcome new technical advances because they extend the photographer's ability to create the pretty, persuasive and heavily-connotated pictures advertisers demand. What all this points to, of course, is that *a* photograph is not just a photograph.

Different genres of photography have different visual, aesthetic, and narrative forms that distinguish, say, news photography from fine arts or advertising photography. If we need further evidence of the differences in photographic genres, a very good piece is that they have different codes of ethics: The kind of photographic manipulation that helps win an award for an advertising photographer gets a news photographer fired.[1]

One journalistic reaction to the new imaging technology has been to extend existing codes of ethics, which address set ups and alterations, to digital technology. Tony Kelly notes that the *San Francisco Examiner* takes the position that it does "not permit anything to be done to a photo electronically that could not be done in a traditional darkroom."[2]

In discussing journalists' reactions to digital alteration at a Poynter

Institute conference on photojournalism ethics, Kelly notes that some journalists felt that even darkroom techniques are being overused and that allowing such manipulations was "letting the camel get his nose under the tent," and making it difficult to determine where to draw the line.

According to Kelly, the overriding concern among journalists was the fear that the credibility of journalism might be eroded by digital imagemaking. The protocol these journalists came up with to deal with the ethics of photo manipulation reflected this concern:

> *Manipulation of (documentary and news) photographs, which alters the content or context is unacceptable. Electronic or manual methods should be used only to assure the highest reproduction quality of the photograph. Photo illustrations are conceptual images and should be (easily) distinguishable from documentary photography.*[3]

The term *photo-illustration* was coined to cue readers to the fact that a photograph had been heavily constructed, set up, doctored or altered, that is, that it is a montage.

A more academic reaction is to point out the ideological limits of this debate by challenging its parameters– *to manipulate or not to manipulate.* These parameters are incorrectly premised on the false (and hidden) assumption that there is some purely mimetic or realistic core to images whereby they directly transcribe or reflect reality.

Every photograph is constructed, manipulated, doctored, edited, etc. through selecting cameras, lenses, film, exposures and lighting; framing the subject; positioning and holding the camera; deciding upon chemistry and developing and enlarging times; burning and dodging; re-touching; editing through scaling and cropping; choosing among multiple shots; scanning; layout and juxtaposition; color separations; color correction; stripping; platemaking; and printing.

From this perspective, the capacity of the new digital technology to easily manipulate images has only made more visible the constructed nature of all images.

In the case of news photography, Dona Schwartz argues that focusing on technology misses the fact that becoming a news photographer means learning to recreate a limited stock of conventional news narratives.[4]

In toto, these approaches grind to a halt when they are pitted against one another. Journalists, who believe that the truth, objectivity and credibility of the press are at stake, attempt to hold the fortress against a new technology that could undermine these values. The critics argue that the fortress is built in a flood plane.

Journalists develop *situation ethics* to help them grapple with the ethical issues that arise in everyday work. Although situation ethics fall short when situations arise for which an ethical code hasn't been written, and they don't address philosophical issues such as the ontology of photographic meaning, they do clarify something of the communication practices in which journalists believe they are engaged, such as, their commitment to truth. This value is important because even in the face of devastating critiques of universal truth, a commitment to truth remains a principled position.

Journalistic concern over credibility cuts both ways. It is quite important for readers to believe that journalists are giving them the best information available, but it is not good for society when readers are too credulous.

The recognition that all images are constructed and have an ideological character cannot be denied. The apparent objectivity or naturalness of photographic representation hides a rhetorical form which implies and persuades us of its own credibility. Photos thereby serve the ideology of press objectivity. To the extent that photography's mimetic quality obscures the fact that all news is framed, it becomes a powerful ideological tool.

Still, are we to conclude that every photograph should be labeled a photo-illustration or a montage? And, do we extend this logic to conclude that any manipulation of any image is thereby acceptable?

While both perspectives have strengths and weaknesses, they leave us at an impasse, though *visual criticism* may break this impasse. Visual criticism is a major component of the new visual communication.

Historically, *visual communication studies* incorporated traditional approaches to photography and graphics, but it distinguished itself from them by insisting on visual criticism. Visual criticism analyzes the forms and practices of imagemaking, and it also examines the role images play in society. Work in this area may help us find a framework to account for the fact that images are constructed. It should shed light on the differences among genres of images. And it must raise the issue of media's social responsibility. As for ethics, visual criticism would be quite helpful, if it provided a way to discuss ethical situations without proscribing solutions.

The Visual as Human Communication

Visual criticism began by recognizing that vision and imagemaking are as integral and fundamental to humanity as language, thus the term *visual communication*. However, because language has held a special place in scholars' estimation, it has been the subject of more intensive inquiry than visual communication. As a result, much has been learned about language, and although much of it is specific to language, some of it has had important implications for the study of visual communication.

Since the mid-1950s, when increasing numbers of scholars shifted their attention from high culture to the study of popular culture and mass media, semiotic analysis of burgeoned. Some important semioticians are Roland Barthes, Stuart Hall, James Monaco, John Hartley, Robert Hodge, Gunther Kress, John Fiske, and Judith Williamson, all of whom used semiotic methods to analyze media images. Their works contributed greatly to visual literacy by giving us a better language for describing and analyzing visual communication: e.g., signs, symbols, icons, indices, signifier, signified, referents, codes, conventions, arbitrariness, polysemy, denotation, connotation, signification, codes, conventions, the politics of representation, etc.

This approach moved the study of mass media away from its focus on media's effects on audience behavior to examine media texts (including photographs) and their production. Because of the importance of media in modern society and, in turn, because of the centrality of imagery in media, semiotics has pushed visual communication into the center of debates about the role media plays framing our perceptions.

Pragmatics

Pragmatics, another area of linguistic study, may also provide great insight into visual communication. Pragmatics is the study of *how* people are *able* to communicate. Rudolf Carnap distinguished pragmatics from other areas of linguistics in the following way:

> *If in an investigation explicit reference is made to the speaker, or to put it in more general terms, to the user of a language, then we assign it to the field of pragmatics....*
>
> *If we abstract from the user of the language and analyze only the expressions and their designata [referents] we are in the field of semantics. And if, finally, we abstract from the designata also and analyze only the relations between the expression we are in (logical) syntax.*[5]

Pragmatics linguists (pragmatists) study how speakers come to understand one another, often examining the specific social and cultural contexts of communication. Photojournalists' concerns with credibility, context and content fall squarely into the purview of pragmatists, who are very much concerned with how speakers' and listeners' assumptions about speech allow us to infer meaning from it.

One area of pragmatics called *universal pragmatics* focuses attention on evidence for the existence of universal or transcendental foundations of communication. According to universal pragmatists, these universals between speakers are the logical basis of language, if communication is to be efficient or if, indeed, it is to take place at all.

Paul Grice (1989) and Jurgen Habermas (1987) have made important contributions to the study of universal pragmatics. Grice studies the principles he believes we all assume when we converse. Habermas takes these observations to the societal level, arguing that conversational principles are the necessary foundation of a rational society.

Once the work of Grice and Habermas is discussed, the relevance of pragmatic universals to media ethics will more clear.

Grice's Conversational Principles

Universal pragmatists argue for the existence of normative structures or principles of communication. These structures, they say, are the basic assumptions we make about the speaker-hearer relationships when we speak. I propose that these same universal assumptions provide a basis for visual criticism. I will argue that if there is such a thing as *visual* communication, it must be based in the same set of principles that underlie spoken communication.

Paul Grice, in "Logic and Conversation," developed a series of maxims and submaxims that he claims must undergird conversation in order for it to be rational and mutually intelligible to a speaker and listener.

The maxims are grounded in three assumptions: conversation is based on a series of related (not disconnected) remarks; that a speaker and listener have a common purpose; and that they have a shared sense of purpose about the direction their conversation is taking (thus taking into account the observation that the shared purpose of conversation often changes during its course).

For Grice, a Cooperative Principle guides conversational speech: "Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged."[6]

Grice's maxims are based on the Kantian categories of Quantity, Quality, Relation and Manner.

Grice lists two maxims under the category of Quantity. Both refer to the quantity of information speakers provide:

> *1. Make your contribution as informative as is required (for the current purposes of the exchange).*
> *2. Do not make your contribution more informative than is required.*

The category of Quality contains a supermaxim and two maxims.

> *Try to make your contribution one that is true.*
>
> *1. Do not say what you believe to be false.*
> *2. Do not say that for which you lack adequate evidence.*

The category of Relation contains a single maxim:

> *Be relevant.*

The category of *Manner* refers to how what is said is said instead of what gets said. It contains a supermaxim and four maxims:

> *Be perspicuous.*
>
> *1. Avoid obscurity of expression.*
> *2. Avoid ambiguity.*
> *3. Be brief.*
> *4. Be orderly.*[7]

For Grice, the purpose of speech is to to produce a "maximally effective exchange of of information," and his underlying premise about conversation is that it is a "variety of purposive, indeed rational behavior." He observes that the Cooperative Principle and the speech maxims form the basis of the way people learn (as children) to behave when they communicate. He believes that it is reasonable to make such assumptions about communication, and that we should not abandon the Cooperative Principle or the maxims.

Grice says his maxims should be expanded to explain other purposes of speech such as persuasion or directing the actions of others, and proposes that

> *anyone who cares about the goals that are central to conversation/communication (such as giving and receiving information, influencing and being influenced by others) must be expected to have an interest, given suitable circumstances, in participation in talk exchanges that will be profitable only on the*

> *assumption that they are conducted in general accordance with the Cooperative Principle and the maxims.* [8]

Journalists are among those most concerned about the credibility of communication. Thus, Grice's ethical principles would seem to provide a potentially interesting framework for the ethical analysis of journalism.

Grice places great emphasis on the theory that as speakers and listeners we assume communicative principles are operating when we talk. In the give and take of conversation, we understand the context of our conversation; we assume a constantly reversing speaker-listener relationship that is based on the premises that the speaker is being truthful, informative, relevant and clear; and we infer meaning based on this knowledge by judging its validity on the basis of our own knowledge and experience. All of these assumptions, it seems to me are a powerful foundation for a healthy relationship between journalism and readers.

Jurgen Habermas: Speech and Validity Claims

The German philosopher Jurgen Habermas takes Grice's principles of communication further by arguing that without universal pragmatic assumptions, human communication and society would be impossible. His pragmatic theory is one component of a larger critical theory of society.

For Habermas, the basis of noncoercive society and culture is communicative consensus among its members. That is, in order to achieve consensus, mutual understanding must be achieved through argumentation among people about claims, propositions and assertions that others make.

Habermas believes a set of norms he calls *truth or validity claims* are the foundation of mutual understanding. In becoming a speaker, every individual learns to make propositions, and every proposition carries with it a truth claim. Thus, when competent speakers utter propositions, they imply that they are based in truth. The merits of truth-claims may be debated by the speaker and listener. For Habermas, the ultimate purpose of debating the truth claims underlying propositions is to allow speakers to build a rational and just society.

Habermas (1987) isolates three forms that propositions take and discusses the truth claims they entail:

> *As the medium for achieving understanding, speech acts serve: a) to establish and renew interpersonal relations, whereby the speaker takes up a relation to something in the world of legitimate (social) orders; (b) to represent (or presuppose) states and events, whereby the speaker takes up a relation to something in the world of existing states of affairs; (c) to manifest experiences–that is, to represent oneself–whereby the speaker takes up a relation to something in the subjective world to which he has privileged access. Communicatively achieved agreement is measured against exactly three criticizable validity claims; in coming to an understanding about something*

> *with one another and thus making themselves understandable, actors cannot avoid embedding their speech acts in precisely three world-relations and claiming validity for them under these aspects. Someone who rejects a comprehensible speech act is taking issue with at least one of these validity claims. In rejecting a speech act as (normatively) wrong or untrue or insincere, he is expressing with his "no" the fact that the utterance has not fulfilled its function of securing an interpersonal relationship, of representing states of affairs, or of manifesting experiences. It is not in agreement with the world of existing states of affairs, or with the speaker's own world of subjective experiences.* [9]

For Habermas then, communicative action is not possible without assuming validity claims are implied in propositions and that listeners are able to challenge propositions as wrong, untrue or insincere based on reasoning, moral standards or aesthetic judgment.

Propositions that directly contradict Grice's principles of speech or Habermas' validity claims–such as "I am a liar," "I am lying to you," "What I am saying to you is irrelevant," or "I am insincere"–create logical conundrums because they throw the whole logic of communication into question. Lying deceives us because we we are predisposed to believe that people tell us the truth.

Communication cannot be based on an illogic of untruthfulness, irrelevance or insincerity. Truth, relevance and sincerity appear to be the default modes of human communication.

Journalism as Propositional

The parallels between the values Habermas sees operating in public communication are too close to those claimed for socially responsible journalism to be ignored. Like Grice's principles, Habermas' are concerned with speech and thus he believes his validity claims apply to an *ideal speech situation*. Although journalism is not speech, its claims to be truthful and valid (credibility) open it up to analysis as a *form* of public speech. Indeed, asking journalism to conform to the assumptions and conditions of speech may be quite helpful to both journalists and the public.

First, if one considers journalistic content not to be truth itself but propositions about events that journalists *claim* are truthful, sincere and relevant, then we have established a more accurate definition of what journalists do from a communication stand point.

That is, journalists present *propositions* about events and subjects, and these propositions carry truth and validity claims. Essentially journalists claim that their propositions are the most truthful, relevant and sincere propositions they can make about a subject at a given time.

Second, such a *propositional* definition situates serious journalism on terrain far closer to what the First Amendment protects: the public expression of propositions important to society.

Third, by recognizing journalism as propositional, the public is encouraged to engage in a discourse with journalists by questioning the validity of their claims and by communicating counter-propositions.

Fourth, the fact that journalism becomes a sounding board for public policymaking enhances its status.

Communication and Society

Before we apply these pragmatic principles to the criticism of photojournalism, another aspect of Habermas' thinking should be mentioned, and that is the centrality of communication in Habermas' critical theory of modern society.

In his theory, Habermas argues that public discourse is necessary to build a rational society. He believes that in moving from a theological forms of society to modernity humanity made a major philosophical break with metaphysical and religious conceptions of society. In the modern epoch, philosophy turns its attention to the rational construction of society, its behaviors, norms and values. He writes:

> *Modernity is characterized by a rejection of the substantive rationality typical of religious and metaphysical worldviews and by a belief in procedural rationality and its ability to give credence to our views in the three areas of objective knowledge, moral-practical insight, and aesthetic judgment.*[10]

Thus, rather than truth being bestowed on humanity from above and decisions being made on the basis of unrelenting faith in doctrine, as in theological societies, Habermas argues that the essence of modern society is that its social institutions should be rationally c constructed through public discourse.

In his *ideal speech situation*, people and groups have the opportunity to advance and challenge propositions, and they must not be hindered from participating in public discourse.[10] Habermas calls the social space for such discourse the *public sphere*. If we consider journalism to be part of the public sphere, then individuals should have a right, even a responsibility, to participate in it.

Like other members of the Frankfurt School, Habermas worries that the rational mandate of modernity is in danger of being lost. He argues that instrumental reason, rather than critical inquiry and open discussion, governs much of today's decision-making. He observes that modern bureaucracies tend to gravitate toward technical rationality, which provides inertia to support decisions that fit established paradigms of thought and behavior and favors decisions that are favorable to institutions but not necessarily individuals or society. Bureaucratic discussion is often restricted by elites to the means for implementing decisions.

In short, modernist society is in danger of being overrun by a technical one in which instrumental reason concerns itself with means and short-term goals and stifles discussion about the qualities of a good society, its long-term aims, and the methods needed to build such a society.

For Habermas then, the cornerstone of a modernist view of society is the pragmatic assumption that we are able to enter into rational discourse with one another. As Habermas notes in the opening of "Discourse Ethics," "As long as moral philosophy concerns itself with clarifying the everyday institutions into which we are socialized, it must be able to adopt, at least virtually, the attitude of someone who participates in the communicative practice of everyday life." [11]

Habermas argues that communicative action—with the expressed purpose of achieving mutual understanding—is the telos of society.[12] A critical theory of society based in communication is a powerful one because it ties together cognitive, political, aesthetic and ethical dimensions. It also establishes as a human priority the building of a good society through rational and equal relations of principled communication.

The question before us now is whether Grice's insight that communicating is grounded in a set of universal ethical principles and whether Habermas' communicative ethics and his critical view of modern society can be applied to media ethics. As a start, we can consider the ethics of photography and photo editing.

Ethics and Photography

Photojournalism has an obvious advantage over other genres of photography, such as advertising photography, in constructing an ethic, because it espouses the ideals of truth and social responsibility. It is not difficult to see that Grice and Habermas' principles provide a guide for addressing some ethical problems that arise in journalism as communication. And Habermas' insistence on the importance of public communication in building a rational society encourages us to consider the relevance of journalism to society.

Figure 1 shows one way communicative ethics might be used to raise questions and issues about journalistic practices.

If one assumes that journalistic propositions should be challenged rather than being taken for granted, then even digital manipulation can be considered valid, like carefully choosing words and syntax in speech. If photo manipulation removes something that is irrelevant to the subject and doesn't falsify the subject, why shouldn't it be used?

It is of course important that all Grice's maxims be met in every photograph, not simply most of them. For instance, if a photograph gives a false sense of a subject, whether the photo is unambiguous is beside the point. Further, if these principles are *universal standards*, one principle cannot be violated to achieve another end, even a higher level truth. But if a photo manipulation helps a photographer frame a more truthful, relevant and sincere proposition, should it not be utilized?

When we look critically at what journalists say about the new photography, we see many traces of the bureaucratic and technical rationality that Habermas' discusses. For instance, the protocol quoted (above) by Kelly says that digitizing a photo is acceptable if the intent is to improve it *technically*. And editors' concerns about credibility seem to want the readers to have "faith" in journalism rather than actively challenging its every word.

Following Grice's ethical principles also empowers journalists over and against their editors by making it a journalist's responsibility to challenge photographic misappropriation or misrepresentation by an editor. To do

Figure 1: Applying Principles of Communication to News Practice

Grice: Is this photo as informative as required?

News Practice:	Does this photo or series of photos tell the whole story, or as much as possible, or as much as is needed for the reader comprehension?
	Would another photo better inform?
	Would more information such as background, context, or alternative views help the reader better understand the subject?
	Does a lack of information or poor framing distort the subject?

Grice: Is this photo more informative than required?

News Practice:	Do I need a photo for this story?
	Can the meaning of this photo be clarified by cropping?

Grice: Is your contribution true?

News Practice:	Does the photo say what you believe to be false? Does it say something for which you lack adequate evidence?
	Is the photo libelous?
	Does it give readers a false idea about the subject?
	Does the caption or cutline make the photo validate something untrue or that you do not know to be true?
	Are editors misappropriating or misrepresenting your work?
	What evidence would better support your claim?

Grice: Is this photo relevant?

News Practice:	To the story? To the reader?

Habermas: Is this photo relevant?

News Practice:	To building a better society?
	What is the purpose of photojournalism and a free press?
	Is journalism fulfilling its special obligation as a forum for public communication?

Grice: Is the meaning of this photo clear and Precise? Obscure? Ambiguous? Orderly?

News Practice:	Has the subject been clearly framed? Do the techniques used to produce this photo improve it as communication?

so addresses an issue of bureaucratic rationality, which is seldom discussed. Why is it that among the stories told about journalistic ethics, we hear from photojournalists about how editors misappropriate their photographs, but we have no published accounts of such incidents. Has an editor ever been fired for misappropriating a photograph?

Finally, and this is just a casual observation, there seems to be a lot more fluff in photojournalism today, and I suspect it is not because photojournalists aren't interested in doing substantial work. The relevance of photojournalism to building a good society is unquestioned, but its superficial application in fluff and feature are open to question. Habermas would have us question the social relevance of every word and image that appear in the press.

Conclusion

In the old ideology of photojournalism, the camera was an instrument for accurate documentation, which defined the photograph as an artifact of the truth. From Habermas' perspective, the whole institutional setup of journalism, which privileges journalists' statements as truth, is called into question. In Habermas' definition of communicative action, no speaker's utterances have a privileged status as truth and in modern society nothing is to be taken as an article of faith.

For Habermas, the validity of all communications propositions is open to question. The journalistic ideology of objectivity interferes with the public's perception of the news by defining it as something other than journalists' propositions about events.

Readers and journalists would be better served by understanding journalism as simply the most truthful, relevant and sincere propositions that journalists can form about a subject at a given time. Journalism's own newly acquired self-effacing practice should encourage readers to challenge journalists to defend the validity of their propositions. Cultivating such mutual expectations between the public and journalists requires journalistic institutions to invite readers to actively participate in news production.

Some community participation in local journalism has already begun. In many cities, small local, community and alternative newspapers are being published. Even major newspapers are showing more concern for public participation in media. The *Star-Tribune* in Minneapolis is creating a new team of journalists to go into local communities to help people raise and address community issues and then to report on them.

These practices and other innovations need to be expanded and carried out nationwide. In doing so, perhaps journalism will turn individual participation in public policymaking into a modern social ritual.

Endnotes

1. Paul Lester (1991). *Photojournalism, An Ethical Approach* (Hillside, NJ: Lawrence Erlbaum Associates). Lester's excellent book on photojournalistic ethics documents a number of cases of photographers being fired for setups.

2. Tony Kelly (1991). "Manipulating Reality, Digital alteration of photos discussed at Poynter seminar," in *Editor and Publisher*, 124.23: pp. 16–17.

3. Ibid., p. 17

4. Dona Schwartz (1992). "To Tell the Truth: Codes of Objectivity in Photojournalism," *Communication* 13.2: 95–109.

5. Rudolf Carnap (1943). *Introduction to Semantics* (Cambridge: Harvard University Press), p. 9.

6. Paul Grice (1989). "Logic and Conversation," *Studies in the Way of Words* (Cambridge, MA: Harvard University Press), p. 26.

7. Ibid., pp. 26–29.

8. Ibid., pp. 28–30.

9. Jurgen Habermas (1987). *Theory of Communicative Action, Vol. 1: Reason and the Rationalization of Society* (Boston: Beacon Press), p. 308.

10. Jurgen Habermas (1990). "Philosophy as Stand-In and Interpreter," *Moral Consciousness and Communicative Action*, (Cambridge, MA: The MIT Press), pp. 3–4.

11. Ibid. Chapter titled" Discourse Ethics," p. 48.

12. For a discussion of the teleological function of communicative action see Habermas' discussion of Austin's illocutionary and perlocutionary speech acts in *The Theory of Communicative Action*, pp. 288 -295. He argues that the use of language with an orientation to reaching understanding is the "original mode" of language use, upon which other forms of use are "parasitic." In this sense language is the *telos* or foundation of society, if, of course, we agree that a modern society should be founded in mutual understanding rather than coercion.

Using Digital Image Elements to Produce Schematic Pictures

Rune Pettersson

Background

ELLEMTEL is an internationally well-known Swedish R&D company working in the field of telecommunications. More than one thousand people have access to a computer network. Most people use SUN workstations, and some have Macintosh computers.

In any organisation devoted to R&D, people produce documents such as memos, instructions, reports, and even books. Some documents are intended for internal use only, some for wider use. In both cases it is important that the readers (receivers) understand the content of the written messages. However, this is not always the case. Some people complain that documents are hard to understand.

Representations

For Wileman (1993) all kinds of representations of an object are symbols. He argues that there are three major ways to represent objects—as pictorial symbols, as graphic symbols, and as verbal symbols—ranging from concrete to abstract representations. Pictorial symbols include two subgroups; photographs, and illustrations/drawings. Graphic symbols include three subgroups: image-related graphics, concept-related graphics, and arbitrary graphics. Verbal symbols include two subgroups: verbal descriptions, and nouns or labels.

Pictorial symbols

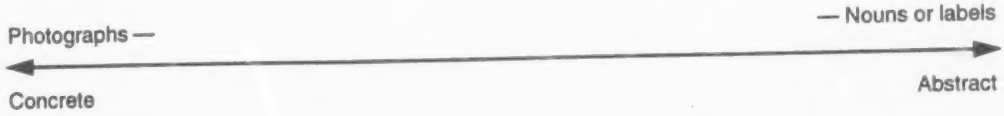
Photographs
Illustrations/drawings

Graphic symbols

Image-related graphics
Concept-related graphics
Arbitrary graphics

Verbal symbols

Verbal descriptions
Nouns or labels



According to Wileman (1993) symbols range from concrete to abstract representations, from photographs to nouns or labels.

There seems to be no major difference in "abstractness" between abstract arbitrary graphic symbols and verbal symbols. Thus, I prefer to talk about two categories of representations: figurative representations and non-figurative representations (Pettersson, 1993 a).

In my view, figurative representations include two groups: *visuals* and *graphic symbols*. Visuals include four subgroups: three-dimensional images, photographs, drawings, and schematic pictures. Graphic symbols include three subgroups: pictorial symbols, abstract symbols, and arbitrary symbols.

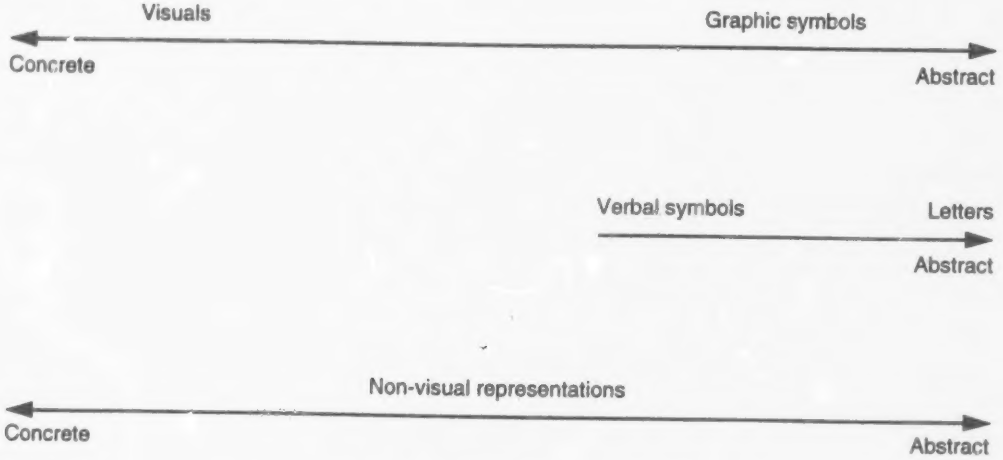
Non-figurative representations include verbal symbols, and other non-figurative representations or rather non-visual representations. Verbal symbols (or verbo-visual symbols) include three visual subgroups: verbal descriptions, nouns or labels, and letters/characters. "Non-visual representations" include audial representations like sounds and signals, as well as representations based on smell and taste. These "non-visual" representations are not further discussed here.

Figurative representations

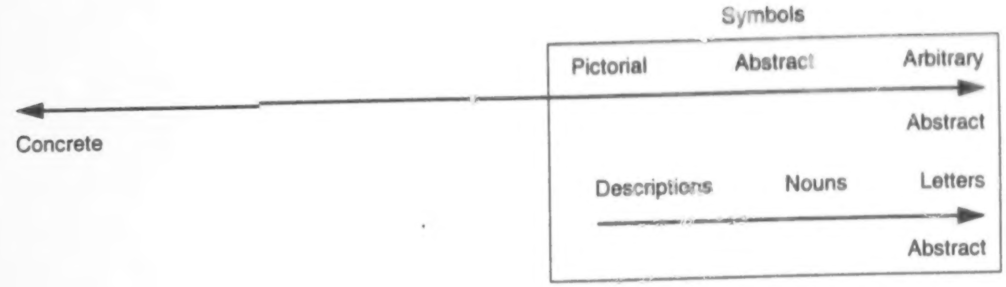
- *Visuals*
  - Three-dimensional images
  - Photographs
  - Drawings
  - Schematic pictures
- *Graphic symbols*
  - Pictorial symbols
  - Abstract symbols
  - Arbitrary symbols

Non-figurative representations

- *Verbal symbols*
  - Verbal descriptions
  - Nouns or labels
  - Letters/characters
- *Non-visual representations*
  - (Sounds...)



According to Pettersson (1993 a) representations range from concrete to abstract ones.



Symbols can be figurative (upper field) as well as non-figurative (lower field). All symbols are more abstract than concrete.

Symbols

There are figurative as well as non-figurative symbols (Pettersson, 1993 a). Graphic symbols include pictorial symbols, abstract symbols, and arbitrary symbols. Verbal symbols include verbal descriptions, nouns or labels, and letters/characters.

Pictorial symbols, or *representational symbols*, are "image-related" graphic symbols. They are simplified pictures, and resemble the objects they represent. Pictorial symbols can be characterized as silhouettes or profiles with no surface detail. A traffic sign with a silhouette of a locomotive, to denote a railroad crossing, is a good example of a pictorial symbol.

In the design process, some pictorial symbols can be successively simplified into figurative and *abstract* graphic symbols. They still look like the objects they represent but have less detail than pictorial symbols. In athletic contests, like the olympic games, abstract graphic symbols are often used to denote the different kinds of events. Good abstract graphic symbols are intuitive. We should be able to understand their meaning.

Some figurative symbols are *arbitrary* graphic symbols. They are formed by the designer's creative imagination. Usually, arbitrary graphic symbols have no resemblance at all with the objects or the ideas that they represent. Many are based on basic geometric shapes. Many signposts and traffic signs are good examples of arbitrary symbols. They are unambiguous by convention; we agree and decide on their meaning. Just as new words have to be learned when we begin to study a new topic, we have to learn arbitrary graphic symbols.

Many non-figurative *verbal symbols*, written characters, and letters of various alphabets, have evolved from simplified pictures. Verbal symbols are used in written languages and in many branches of science. In many areas, verbal symbols have gained universal acceptance.

Taking up only a very small amount of space, a graphic or a verbal symbol can convey a message containing a large amount of information. But it is not possible to make anything but *simple statements* by using symbols for objects, actions and events. Eco (1976) suggests that the verbal equivalent of an iconic sign is not a word but a phrase, or indeed a whole story. Of course, this is also the case with a large number of the Chinese kanji-characters, designating different words or sometimes whole phrases.

Meaning

Pettersson (1986, 1987, 1993 a) concluded that *perceived image content is different from intended image content.* Even simple pictures can cause many different associations, and a given set of basic picture elements and symbols can be combined to form completely different images. Moriarty and Sayre (1993) studied intended and perceived advertising meanings. They also found a high level of *disagreement between intended and perceived messages.* More than half of the responses were different from those intended by the creators.

Several different signs and symbols can be used to convey the same information—the same meaning. In an exercise, subjects were asked to vote for candidates on a ballot. The ballot looked like this.

Ballot

President		
(vote for one)	Ken Adams	___
	Diana Bates	___
	Leo Davis	___
Vice president		
(vote for one)	John Bell	___
	Jim Cannon	___
	Nancy Carr	___
	Carol Dennis	___

Several different signs were used to convey the same meaning, namely a selected candidate.

/, ✓, ×, ✱, •, **ok**, →

Even more signs could be used to convey the same meaning, "this is my candidate". It is actually also possible to cross over the names of the people that are not selected. The meaning of a symbol is seldom easy to guess. Pettersson (1989), as well as Griffin and Gibbs (1992), found that graphic symbols were interpreted in many different ways. Sometimes only a few persons will understand the intended meaning of a symbol. Thus the sender will always have to supply an explanation for the symbols used in a report, on a map or in any other document. This can be a chart or a list of symbols and their meanings.

Use of symbols

Image perception is very rapid, virtually "instantaneous" (Pettersson, 1989). Reading and comprehending the equivalent message in words takes much more time. So graphic symbols permit *rapid reading.* This is important in numerous situations, in traffic, industry, and aviation, for example.

A good symbol is designed so that it can be used in many different situations. For example, the McDonald's M is designed to work in every conceivable size from a height of a few millimetres in a brochure to more than six feet in outdoor signs.

At the end of his book on writing for science and technology, Kirkman (1992) noted the possibility of using symbols (page 155):

> Perhaps, since use of words causes so much difficulty in international communication, we should abandon words wherever possible, and use icons instead.

Symbols (icons), may well become more and more common in communication. Kirkman commented (page 156):

> I have no doubt that we shall gradually have to include more and more icons in our presentations of information, especially in our onscreen presentations.

We can use symbols for many different reasons (Pettersson, 1989).

Identification. Graphical symbols can be used effectively in manuals and on screens to help readers with quick recognition and identification of information.

Overview. Symbols can be used for creating an overview and providing a holistic perspective. This property is utilized in maps and informative signs as well as in catalogues and project reports.

Supplying instructions. Symbols can be used for supplying instructions and information about appropriate behavior in different situations. Numerous examples can be found in catalogues and timetables. Various traffic signs also belong to this category.

Position. Symbols can be used for illustrating the spatial and geographic position of different objects or services. One example is the floor plan of an exhibition hall with symbols designating the location of telephones, lavatories, information booths and refreshment sites. Another example is maps with numerous cartographic symbols for objects and conditions.

Size. Symbols can be used for illustrating size relationships and to supply numerical and statistical information. Some diagrams and many symbols in maps are examples of this category.

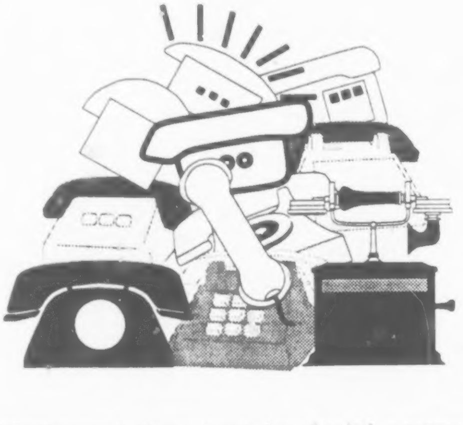
Representation. Symbols can be used to represent an organization, service or product. Trademarks and logos are utilized in marketing, advertising, and public relations. As a rule, promotion of the representation begins with text (e.g. a company or product name), followed by text + a symbol. Ultimately the symbol alone suffices. Examples: McDonald's yellow M and Shell's scallop.

Media. Symbols are employed in different media. They are static and immutable in graphical media. They may be more changeable in computer-based media. When you select a brush in the menu for a Macintosh drawing program, the brush icon switches from positive to reverse video. This "acknowledgement", which tells you that the command has been received by the machine, makes communication more reliable.

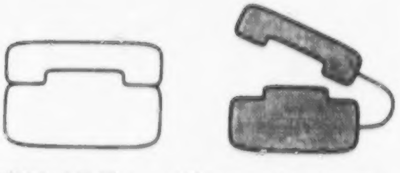
It can be concluded that every situation and every context demands the consistent utilization of symbols, an explanation of the symbols used, and learning the meaning of those symbols. Well-designed symbols can be used, and can work in different cultures in different parts of the world.

Schematic pictures

At ELLEMTEL most people create their own schematic pictures in their documents. There are many ways to create even a very simple schematic picture. Thus the quality of the pictures ranges from "very good" to "very poor". Several people have designed their own graphic symbols, which they use in various combinations in their pictures. In a sample of documents, no less than 29 different "telephone pictures" were used. Some of the telephone pictures were well-drawn schematic pictures, some were pictorial symbols, and some were abstract symbols.



Telephones 1. Some examples of existing representations of telephones.



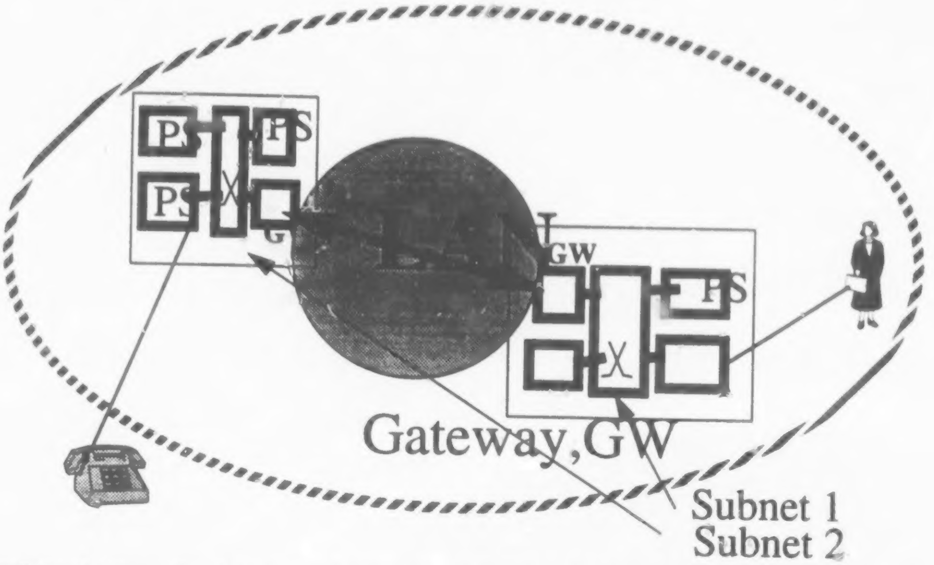
Telephones 2. The resulting graphic abstract symbols for telephones, passive (left), and active (right) to be used in schematic pictures.

This variety of symbols and image elements used in schematic pictures makes it hard for readers to understand the messages. Usually, the variety is not aesthetically pleasing. It does not aid comprehension, rather it introduces a lot of confusion. Technical documentation must be easy to comprehend. It is therefore vitally important to be consistent and use the same symbols in different schematic pictures.

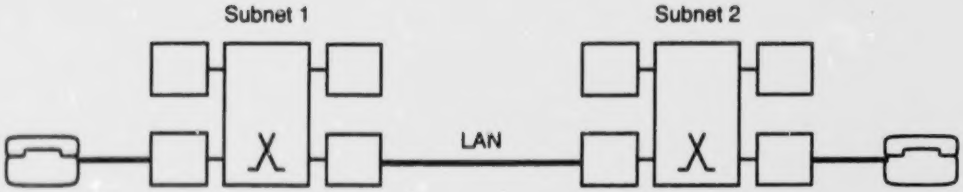
Those who work with information cannot content themselves with a message being produced and transmitted, as in radio and TV; nor with a message being produced, transmitted and received by an audience. The act of communicating is not complete until our message has been both received *and* understood by the audience. In other words, *our messages must always be comprehensible, otherwise they will have no effect.* Pettersson (1993 b) provides several guidelines on how to make documents more comprehensible.

An image database

At ELLEMTEL, a "terminology council" is responsible for the development of the new terminology that is needed. Since symbols can be regarded as "iconic or figurative representations of concepts", a set of carefully defined symbols has been created as image elements. These symbols are stored in digital form and can easily be accessed from all workstations in the network. We have also written "guidelines" to make it easier for people to create their own schematic pictures.



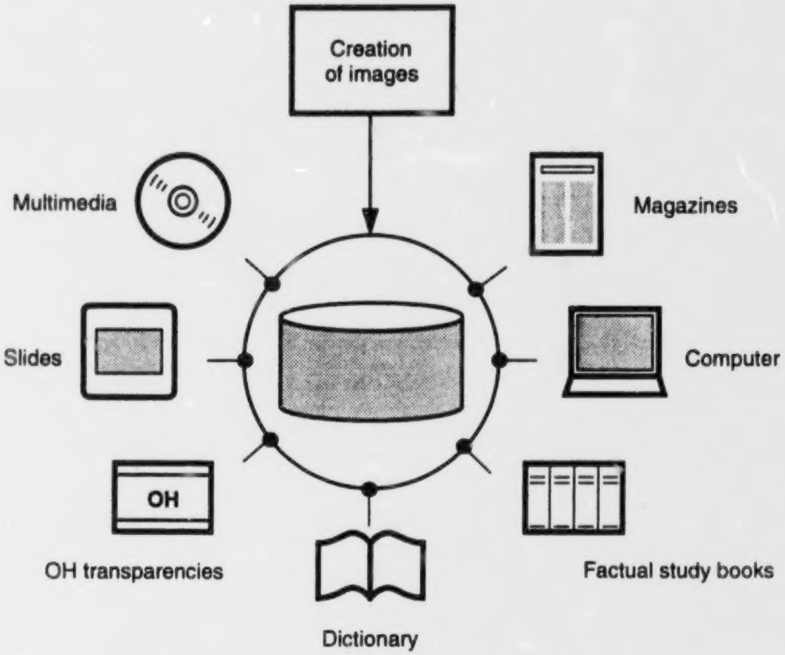
A traditional schematic picture. An ugly example of the kind of schematic picture that can be found in internal technical documentation. This kind of picture is costly to produce, and it violates most of our guidelines for the design of schematic pictures.


Subnet 1
Subnet 2
LAN

Using image elements and approved graphic symbols makes production as well as reading much more effective. This schematic picture conveys the same content as the previous illustration.

The new images can be stored in a database and used in different documents, such as memos, instructions, reports, magazines, and even books. Images can also be used in other media, such as computers, OH transparencies, slides, and multimedia. Since the formats are different, images must be adopted to each medium (Pettersson, 1993 a).

It can be concluded that using standard image elements and standard symbols in schematic pictures is very cost-effective. Using standard image elements and standard symbols also makes it far easier for all readers to understand the intended messages. The readability of schematic pictures is increased.


Creation of images
Multimedia
Magazines
Slides
Computer
OH
OH transparencies
Factual study books
Dictionary

An image database makes it possible to use the same images in several different media.

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Visual Information Strategies in Mental Model Development

Jeffrey M. Renk
Robert C. Branch
Echeol Chang

We are not born *tabula rasa.* It is a perception that an individual's cognitive structure is a result of the modeling methodologies acquired through experience. Mentally constructing models to serve as representations of objects and events is fundamental to cognitive functioning. Donald (1991) suggests that modeling advances cognitive functions to higher levels in an individual's search for the power to resolve ambiguities and to support a certain level of culture. Thus, an individual's inherent drive to mentally engineer increasingly powerful models of the world, built upon information, is the engine powering cognitive development.

> It is an individual's nature to mentally model objects and events.

Mental Models

A mental model is a domain-specific representation of an object or event used to explain or predict. The American Heritage Dictionary (1979) defines mental as: "Done or performed by the mind; existing in the mind." Further, the American Heritage Dictionary (1992) defines a model as: "A schematic description of a system, theory, or phenomenon that accounts for its known or inferred properties and may be used for future study of its characteristics." Thus, a mental model is created and exists in the mind as a description of a system, theory, or phenomenon.

Scientifically, the term mental model seems to elude such a concise definition. Definitions range from Minsky's (1985, 1986) suggestion that a mental model is anything that helps an individual answer questions about something, to Norman's (1983) definition of "an often technically inaccurate naturally evolving representation of a target system that is. . .incomplete. . .unstable. . .lacks firm boundaries. . .unscientific. . .and are parsimonious."

Synthesizing available literature, mental model is defined as:

- personal mental representations of objects or events;
- domain-specific; and
- used by individuals to explain or predict.

These three characteristics are the keys to crafting a visual environment with software tools to assist in mental model development. A mental model is a representation, thus it has structure. A mental model is domain-specific, therefore, a domain may be identified and modeled. A mental model is used to explain or predict, thus, causal relationships are externally modeled then extracted from the model by the viewer to serve this function. Employing visual information to model a system's structure and inherent causal relationships are thus crucial in assisting the viewer with mental model development.

Mental models are domain-specific representations used to explain or predict.

Mental Models and Visual Information

Visual information may be presented via visual media to influence the development of a viewer's mental model. Visual information consists of the pictures, graphic symbols, or other imagery used in visual communication. Visual communication is the use of visual information to convey meaning. Mental models are built from personal interpretation of information. Information is stored in mental structures called knowledge bases and is acquired through the senses with the visual system providing one of the densest paths of information. Saunders' (1994) suggestion that visuals appeal to the intellect and communicate, as well as Ballstaedt, Mandl, and Molitor's (1989) suggestion that visual media may be used to facilitate the construction of a mental model, leads one to the conclusion that visual information has the potential to impact mental model construction via communication of a system's structure and causal relationships.

Visual Information
Facilitates Mental Model
Development

Mental Modeling Concepts

Visual information presented to assist in the development of mental models must provide a visual model that is analogous to an actual system and allows the inference of causal relationships. Seel and Strittmatter (1989) suggest that the minimum precondition for mental model construction is analogous structures between the original system and the model. The degree of correspondence between the model and original is further determined by the degree of similarity between the attributes and inferred causal relationships existing between the attributes for each. Seel and Strittmatter seem to further postulate:

- Mental models do not develop automatically. They develop through conscious information processing.

- Mental models are built from personal interpretations of existing knowledge bases that represent a specific domain of the external world. Mental models thus result from an individual's interaction with personal knowledge bases.

- Since mental models are developed from knowledge bases, images only ignite the development of mental models and assist in making the models concrete.

- Illustration serves two functions: mapping and heuristic. The mapping function is the delivery of facts by the media. The heuristic function initiates thinking.

Analogy-making, important in Seel and Strittmatter's (1989) concept of mental model development, was suggested by Mitchell (1993) as the mechanism for distilling the essence of a situation and transportation to a different situation and adapted via conceptual slippages. Conceptual slippage occurs when a concept embedded in an existing mental model is put under pressure from

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This slippage allows a
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development of mental
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of Modeling

els facilitate mental inves-
system or relationships
ns. Consider different
such as a model of a train,
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tion because they can be
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models such as those of
litions or mathematical
e mental investigation
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els initiate mental inves-
Mental models, though
ntally picked up, turned
art, and so on. Mental
the intellectual skill of
is an example. Paivio
(1986) suggests that the visual component or system of information storage is initially used in problem-solving to rotate and examine the problem space. The verbal system is then incorporated into the examination to probe and analyze the problem space further. Mental models facilitate mental investigation because they may be manipulated during exploration. Usage of mental models in this capacity is present in the areas of physical sciences, mathematics, and writing. Mental models also facilitate the depth of information processing, therefore, resulting in greater understanding, retention, and transference to novel situations.

Physical Science

In the field of physical science, Einstein achieved his greatest insights via engagement with mentally visualized systems of light waves and idealized physical bodies (Shepard, 1978). James Clark Maxwell arrived at Maxwell's equations, not by logical reasoning, but by a series of increasingly abstract hydrodynamic and mechanical models of the medium (Shepard, 1978).

Mathematics

Mental model development specific to mathematics may benefit from engagement via visual information with mathematical theories, principles, and concepts. Piaget's theory of cognitive development suggests that cognition progresses from concrete representation to abstract representation as one ages. Perl (1993) relates that tools called "manipulatives" are used to assist this progression. Manipulatives are concrete, physical objects that can be manipulated and visually inspected. In mathematics, manipulatives are used to *model* abstract concepts. Experimentation with manipulatives assists the movement from concrete to abstract representations; from fragmented facts and concepts to mental models.

Perl (1993) provides the example of the use of brightly colored geometric shapes called attribute blocks as manipulatives. The attribute blocks come in four shapes, each in three colors, and of two different sizes. School children build a "train" from the blocks, with adjacent blocks varying by only one characteristic at a time. The attribute blocks provide highly visual, concrete stimuli to foster mental model development of abstract theories.

Writing

Carley and Palmquist (1992) suggest representing mental models as visual maps extracted from written and spoken prose. Underlying concepts and structures may then be analyzed. An implication is that such visualization could assist in the *development* of mental models necessary for one to write. The maps can be explored and manipulated, serving to create and refine mental models of prose structure and rules.

Depth of Processing

Mental models are multi-dimensional and possess informational depth. Visual three-dimensional modeling provides a visual environment that is information-rich and is multi-dimensional. Visual three-dimensional modeling, whether of objects or events, is built on data. Data for specific modeling applications may be required from a vast array of disciplines. Therefore, data collection requires active thinking regarding what data is needed, from where, and in what form. Such an environment provides for the social sharing of cognition (each discipline participant's mental model is affected by the other different discipline participants). Further, in the area of graphing, Schwartz (cited in Kinnaman, 1993) believes that one must be able to *enter* a graph and *see* the corresponding changes in symbolic form of the function itself. Visual information portrayed in this manner would allow the viewer to enter the system itself and navigate via their mental model that is continually being updated through feedback from hypothesis testing.

Mental models are powerful tools in an array of disciplines. The models may be built on visual information and serve to facilitate mental investigation.

Mental models can be tools,
built on information, that
facilitate mental inquiry.

Information Transformation

Information, the building block of mental models, is accelerating in production. Time, as a personal commodity with which to attend and process this accelerating information base, is diminishing. Mental model strength is dependent on updated, comprehensive information that may be perused and perceived timely. Thus, the nature of information must change from primarily text-based to imagery-based.

The nature of information is changing. White (cited in Fredette, 1994) suggests "the change in information is a shift from print to imagery as the medium for information delivery, transformation, and exchange." White further asserts that imagery is our major information carrier.

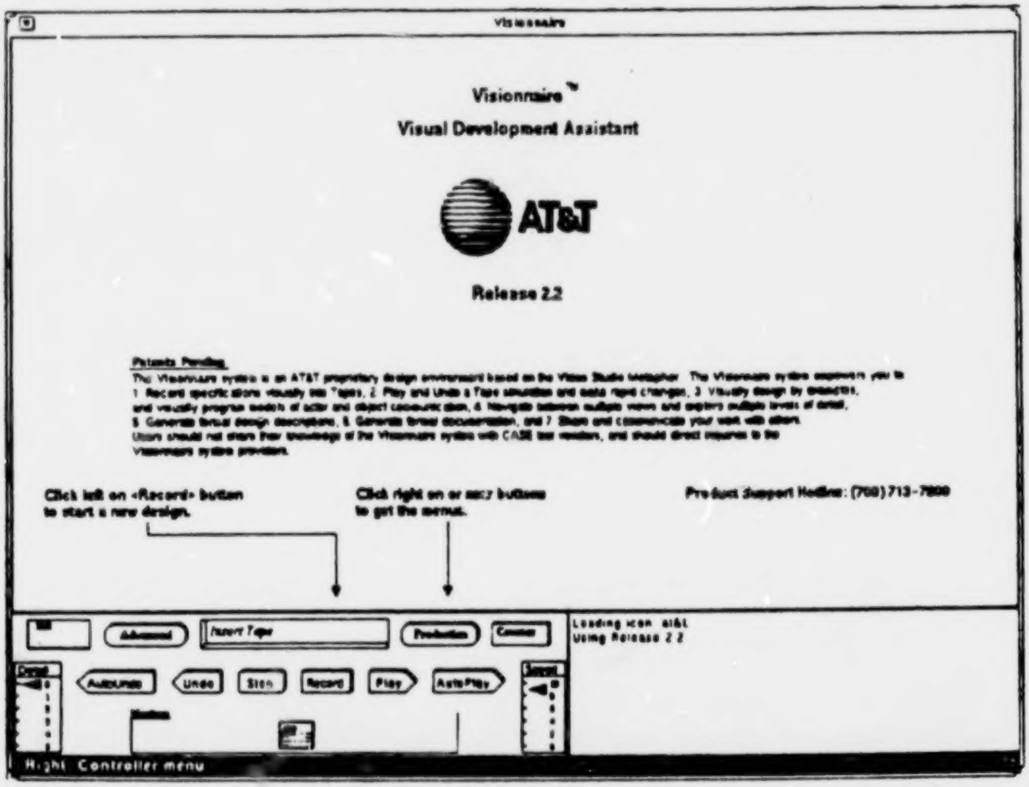
This trend is exemplified in today's instructional media such as multimedia; of a world community requiring communications to be interpretable across cultures; and in mathematical concepts being envisioned pictorially. Alas, the bold escape from Edward Tufte's (1990) "flatland" created by textual information is underway. Imagery, or visualized information, is becoming the new nature of information. Increasing computational power may be harnessed to capture and deliver visual information to assist in the development of mental models.

Imagery is becoming
the new nature
of information.

Visionnaire™-- A Tool

Visionnaire™ is a systems modeling software program developed by AT&T Bell Laboratories initially to assist in clarifying large, complex telecommunications switching systems. The Instructional Design, Development and Evaluation (IDD&E) department within the School of Education at Syracuse University is engaged in a collaborative effort with Bell Laboratories to investigate the applications of Visionnaire™ as an instructional systems and mental modeling tool.

Visionnaire™ runs on a Sun™ computer under OpenWindows™. Visionnaire™ uses a Video Studio Metaphor to support rapid prototyping and improve ease of use by non-programmers. The Video Studio Metaphor is based on the analogy of video store operations and film production. The graphical user interface is that of a VCR as shown in Figure 1. The application development interface incorporates visual programming techniques and revolves around the analogy of film production. The developer describes and records the "scripts" that specify the relationship and subsequent action between two or more objects called "actors". Scripts may execute sequentially or in parallel and at various levels of system information detail. A collection of scripts and actors comprise a scenario and are stored as a tape, similar to a VCR tape, for later use.


Visionnaire
Visionnaire™
Visual Development Assistant
AT&T
Release 2.2
Patents Pending
Advanced
Insert Tape
Production
Counter
Detail
AutoUndo
Undo
Step
Record
Play
AutoPlay
Speed

Click left on «Record» button to start a new design.

Click right on or near buttons to get the menus.

Product Support Hotline: (700) 713-7800

Loading icon: at&t
Using Release 2.2

Right: Controller menu

Figure 1
Visionnaire™ Video Studio Metaphor Interface

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The core of Visionnaire™ is a knowledge - based simulation engine. Scenarios are represented through object-oriented programming techniques that construct rules of the IF...THEN format. Thus, scenarios are dynamic with pre-conditions and post-conditions of scripts considered and altered during execution, thus changing the state of the actors involved.

Visionnaire™ has been used with switching systems engineers as a vehicle for interactive, dynamic presentations of switching system specifications at design reviews. Visionnaire™, with its animated graphics, visual programming, and script-based scenarios has potential use in modeling abstract complex systems. It is this potential use that was investigated in the collaboration between IDD&E and AT&T Bell Laboratories.

Visionnaire (TM) is
used to visually model
dynamic systems.

The Canvas Under Visionnaire™

Building upon the aforementioned concepts, Visionnaire™ was used to create an animated visual environment on a Sun™ computer that would ignite the development of a mental model of the Instructional Systems Design (ISD) process. This was accomplished by representing the facts and structure of the process and the relationships that drive the process that constitute the essence of ISD. The animated visual environment serves to initiate thinking by displaying changing relationships amongst objects that changed the objects themselves. Simultaneously with Seel and Strittmatter's (1989) theory of mental model development, facts associated with the concepts of dimensionality, shape perception, and image perception were utilized.

Dimensionality

For years artists have used basic truths concerning depth perception to give their artwork a three-dimensional orientation. Kelsey (1993) reports that size, perspective, and shadowing provide one with clues as to the relationship between objects. We perceive larger objects as closer than smaller ones, distant objects as higher on the horizon than closer ones, and objects that appear shadowed by other objects as further away. An additional clue is provided through color. Bolder colored objects are perceived as closer then lighter colored objects.

Shape Perception

Marr (cited in Hendee, 1993), a psychologist who studied perception and its relation to cognition, suggested a three-stage process by which the perception of object shape occurs. First, there is the "primal sketch" of an object's features and intensity variations. Second, there is the identification of more subtle characteristics such as depth referenced to a coordinate frame centered in the viewer. Third, there is mental engineering on the part of the viewer of a three-dimensional model of the object. This process yields a mental model of the object suspended in cognitive "space".

Bottom-Up vs. Top-Down

Kelsey (1993) relates the two competing models for how an image is perceived: the bottom-up model and the top-down model. The bottom-up model suggests that an image is perceived by sequentially building up individual features into a recognizable whole. The top-down model suggests that an immediate "whole" impression, or "gestalt", is formed with the individual features filled in at later stages. Evidence supports both models. Because specific nerves only fire when presented with specific features, and that feature detectors exist in the visual system, support the bottom-up model. The top-down model is supported by our ability to quickly differentiate objects, such as faces we recognize versus those we don't in a crowd.

Weidenmann's (1989) work provided an additional consideration in the design of the Visionnaire™ visual environment. Weidenmann (1989) suggests that a viewer may falsely perceive visual information as non-informative initially and stop processing information. The creator of visual environments must make a conscious effort to protect against superficial attention on the part of the viewer. That is, a creator's desire is to have the viewer engage the visual environment rather then having the viewer complete an initial scan of the environment, consider the environment non-informative, and mentally disengage. The visual environment is arranged so the first scan by the viewer creates an expectation within the viewer that the environment is informative. Thus, information-processing of the visual information is not interrupted, or worse, terminated.

Visionnaire (TM) is used to paint a dynamic, visual environment.

Visionnaire™-- The Engine and Palette

The visual information environment painted by Visionnaire™ incorporates Seel and Strittmatter's (1989) theory of mental model construction, and the facts associated with dimensionality, shape perception, image perception, and superficial attention. Visionnaire™ paints the visual environment pictured in Figure 2.

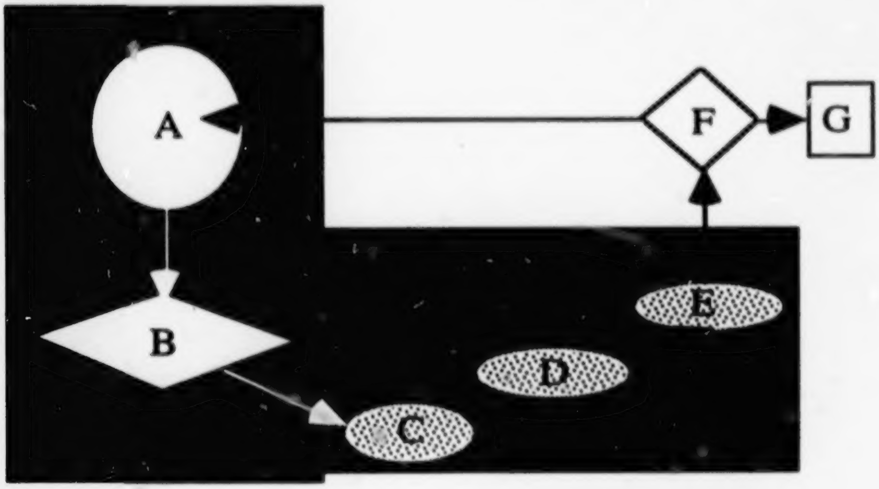
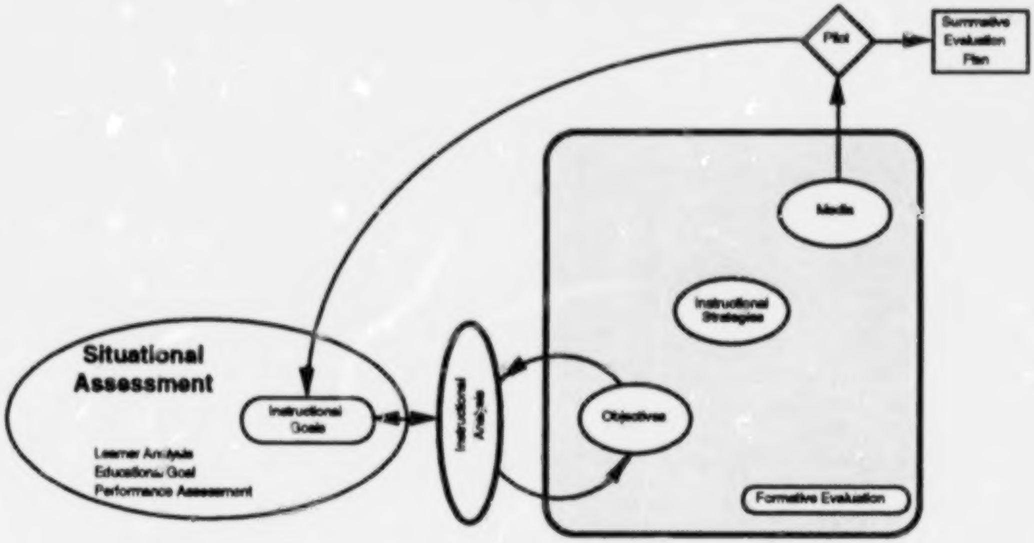


Figure 2

Key:
A- Situational Assessment
B - Instructional Analysis
C - Objectives
D - Instructional Strategies
E - Media Selection
F - Pilot
G - Summative Evaluation Plan

Initial viewer engagement with this environment is at an animated level. Upon viewer selection of "play", the ISD process is animated, with interaction occurring amongst the objects (A, B, C, D, E, F, G). The interactions change the color and size of the objects signifying the influence that actions have on the different stages (represented by the objects) of the ISD process. Thus the essence of the ISD process is demonstrated. The ISD process is systematic and systemic. That is, the ISD process is composed of interrelated parts that interact to achieve a goal. Yet a change in any one part changes at least one other part of the system. This initial engagement is designed to guard against superficial attention on the part of the viewer. Additionally, this approach complies with the top-down model of image perception. The ISD process is initially presented as a gestalt, with specific features filled in gradually throughout the cognitive engagement.

Utilizing Seel and Strittmatter's (1989) theory of mental model construction, the structure of this visual environment closely parallels the original ISD schematic represented in Figure 3.


Pilot
Summative Evaluation Plan
Media
Instructional Strategies
Situational Assessment
Instructional Goals
Instructional Analysis
Objectives
Learner Analysis
Educational Goal
Performance Assessment
Formative Evaluation

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Spring 1994
Syracuse University
Instructional Design, Development and Evaluation

Figure 3
Fundamental Components of the Instructional Design Process

The structures are nearly identical thus providing a general analogy to be drawn between the original and the model. Completion of the analogy requires the causal relationships between objects to be demonstrated. This is accomplished through animated interactions amongst objects. Textual messages move from one object to the next. Upon receipt of a message, the object evaluates the message, and formulates an inquiry back to the sending object if the message is evaluated as incomplete. Upon receipt of a returned message, the sending object elaborates on the message and re-transmits the message to the recipient. Upon re-transmittal, the sending object disappears from the visual display. This signifies the true-to-life fact that time is a constraint on the overall process. There is not unlimited time to clarify and refine questions raised through evaluation at various stages of the ISD process. At this point, the recipient re-evaluates the message, performs the activity directed by the message, and generates a new message to the next object in the system. This activity parallels the bi-directional relationships that exist between various components of the actual ISD process itself. Dynamic activity of this nature is demonstrated in Figure 4.

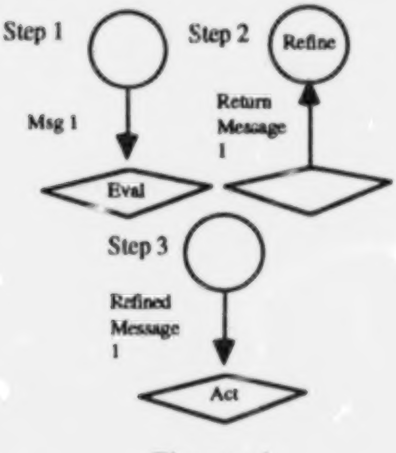

Figure 4

In summary thus far, the visual environment portrays the structure, composed of objects representing the "attributes", "facts" or "components" of the ISD process, and displays the causal relationships amongst the objects. One last component required portrayal to accurately depict the essence of the ISD process. This component is the sense of movement as a function of time. This component is captured by the backgrounds of the various objects as shown in Figure 5.

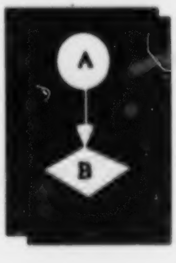

Figure 5

Applying the concept that objects with darker, bolder colors are perceived closer then lighter colored objects, black is chosen as the background for object A and B. Objects A and B represent the components of the general "input" phase of the ISD process. These components comprise events that occur early in the ISD. Extending this scheme, the components representing the "process" (formative evaluation) phase of the ISD process are highlighted against a gray background as depicted in Figure 6. Typically, these components occur midway through ISD.

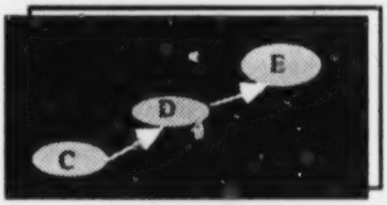

Figure 6

Completing this scheme, the components that represent the "output" phase of ISD are highlighted against a white background as demonstrated in Figure 7.

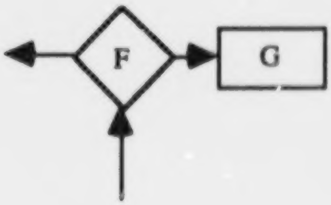

Figure 7

A final consideration concerns the objects themselves. The perception of depth and movement in time as the viewer progresses through the ISD process is augmented by a gradual decrease in object size and color intensity. Object A is the largest object; object G the smallest. Object A is a bold color. Object G is white. Objects B through F decrease gradually in color intensity.

Conclusion

Visual information strategies may be used to facilitate the development of mental models. To be successful, visual information strategies must allow portrayal of the structure of the system to be modeled, allow the inference of causal relationships, and depict the essence of the modeled system. Software tools exist to assist in the generation and presentation of visual information in the execution of those strategies.

Mental models, and the world they represent, are dynamic entities that interrelate in nonlinear, seemingly chaotic ways. Advanced strategies must be developed in the design and use of visual information to capture and portray the essence of dynamic entities. Thus, further investigation is needed to explore the interaction of visual information strategies and the mental modeling of dynamic systems that operate in non-pre-deterministic, non-linear sequences.

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Important Note

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Aesthetics and Screen Design: An Integration of Principles

Brenda Bannan Haag
Wendy Snetsigner

Introduction

Screen design, as an inherent part of the interface within computer-based instructional programs, is a critical component to the communication potential of the medium. Referred to as the purposeful organization of presentation stimuli in order to influence how students process information, screen design produces some cognitive benefit in the student's ability to perceive, organize and integrate information (Hannafin & Hooper, 1989). The visual design of the computer screen has been examined in the literature through various approaches including establishment of guidelines (Milheim & Lavix, 1992), calls for a visual design dimension or aesthetic education within instructional design (Abed, 1989; Martin, 1986) and various empirical research studies (Grabinger, 1989; 1992; Morrison et al. 1989; Aspillaga, 1991).

Guidelines generalized from studies and reviews related to screen design offer specific recommendations as to color, placement and use of elements on the computer screen. Research related to this area identifies and tests variables or combinations of variables related to the design of computer screens and typically compares them with dependent measures of learner achievement or preference. Although the resulting guidelines are useful to the instructional designer, they often do not address the overall visual dimension of the computer screen. The overall visual dimension of the computer screen in an instructional program refers to the integration of individual visual elements that combine to produce the aesthetic of the screen. Aesthetics of the computer screen within instructional programs have been contemplated by at least one instructional designer in her appeal to add the dimension of the aesthetic to traditional cognitive, psychomotor and affective goals of instructional design (Martin, 1986). This paper attempts to further that appeal by establishing aesthetics as an essential and necessary component of screen design and, therefore, of instructional design itself.

Screen Design Guidelines

Hannafin and Hooper (1989) state that effective screen design causes learners to develop and maintain interest in lesson content and promotes the engagement of the learner with the material and facilitates deep processing of important information. The quality of the design of elements on screen may lead to improved performance by sustaining the interest of the viewer (Faiola & DeBloois, 1988). Screen design, therefore, has a crucial role in the delivery of information to the learner.

Various sources for screen design guidelines exist to direct the instructional designer. (Strickland & Poe, 1989; Ng, 1986; Milheim & Lavix, 1992). Many present a list of recommendations that attempt to simplify the visual design process by suggesting appropriate use and placement of graphical and textual elements. Often these recommendations also include specific guidance as to what

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combination of design elements to avoid. These guidelines, however, are deliberately simplified and free of context in order to transfer to multiple screen design situations.

While potentially valuable to the beginning designer, these recommendations are finite and formulaic in their approach to the design of computer screens. Typically, these guidelines address individual elements of screen design such as text, graphics, and navigational tools. Attributes of these elements are also addressed and can include color, highlight, number, or placement. Yet the integration and holistic perspective of these elements and their attributes apparent in visually complex screens is rarely approached in the current literature. The combination of these elements to create an overall design, look, or aesthetic is one not typically addressed.

The role of screen design as the communicative mechanism between the learner and the instructional program demands that the attention be focused not only on the specific elements and their attributes, but also on the aesthetic appeal of the various elements combined.

Screen Design Research

The research base associated with screen design has begun to address multiple combinations of elements of the screen rather than individual variables. The focus of several studies has concentrated on typographical factors. Attributes such as the use of text in headings, directive cues, line spacing (Grabinger, 1992) text density (Morrison et. al. 1989) or location of text and graphics (Aspillaga, 1991) have been examined. Obstacles inherent in this particular research thrust is documented by Grabinger (1989, p.2) who states:

> The number of text elements or variables used in both paper and electronic publishing is quite large. When combined, the number of variables and interactions are so great that two significant research problems arise. First, research into each possible combination of variables becomes a daunting proposition. Second, it is possible that in any particular design the contribution of each element or variable to the overall meaning of the display is quite small.

Grabinger's observations of the problems in screen design research investigating textual factors may be generalizable to various other combinations of visual elements on the screen. It seems there are an infinite number of individual variables to consider in regard to visual elements that makeup a computer screen. Isolating a single variable in an attempt to associate it with an increase in learning is difficult, if not impossible. Grabinger (1989) has proposed a solution to this problem with the categorization of screen design elements in order to simplify the research process. This classification scheme, based on viewers' evaluations of screens, grouped a variety of individual textual variables into three categories: organization, structure and simple. These classifications are his attempt to organize the visual elements or variables more cohesively within the screen design implicit in his studies.

Perhaps this type of classification method will circumvent some of the problems ingrained in screen design research methodology; however, an additional benefit may also become apparent. The shift of focus from the effect of individual screen design variables to more comprehensive categories of various visual elements, as represented by Grabinger, may encourage designers and researchers to rethink the traditional approach to screen design. Grabinger (1989) justifies this approach by stating that individual [text] elements contribute to the "whole" image or screen and that it is the overall combination of elements that makes an impact on the viewer.

Research in this area, perhaps needs to concentrate on the integration and combination of various visual elements on the screen in order to produce practical recommendations in the design of visually complex screens. This research direction represents an aesthetic approach to screen design.

Aesthetics, Visual Design and Learning

A computer-based instructional screen involves various elements and attributes which combine to create an aesthetically pleasing and appropriately functional program. Visual design is defined by Abed (1989) as "the organization of materials and forms in such a way as to fulfill a specific purpose." Visual design should direct the learner to an action or purpose (Abed, 1989). The overall purpose of screen design, in assisting the learner in his or her processing of information, is congruent with the definition of visual design.

Effective screen design attempts to promote communication between the student and the program in order to cultivate learning. The visual organization or design of screens may have an impact on cognitive learning through aesthetically superior programs. Program design with attention paid to the overall aesthetic of the screens may prove to facilitate communication by capturing, holding and focusing the learner's attention on the content (Martin, 1986).

However, a need exists for empirical studies to confirm the inference that aesthetic screen design could facilitate learning. The difficulty of testing an obscure, often subjective feature such as aesthetic design, by its nature, proves to be problematic. Also, aesthetic or visual design of screens cannot be isolated; it must be considered within the other functional and instructional goals of the program. Conversely, caution should be taken with a design approach that focuses only on aesthetics, making it a priority over the interaction between the program and learner. This approach may detract from the communication of the message (Grabinger, 1992). The aesthetic aspect of computer screens must coincide with the instructional design goals of the program in order to ensure effective delivery of the information. Just as form and function go hand in hand so, too, must instructional design and aesthetic design. They are inextricably connected.

Aesthetics and Instructional Design

As Martin and Briggs (1986) maintain, historically within the instructional design field, the aesthetic dimension of media has largely been overlooked. One reason stated for this oversight is the incompatibility of aesthetics with a behavioral orientation. Abed (1989) supports this claim by stating that a perception exists that aesthetic or visual design cannot play a crucial role in the systematic and "predictable" nature of the instructional development process. Yet many experimental researchers and practitioners continue to explore the area of screen design. They continually search for conclusive results and guidelines that will improve designer's approach to the interface in the hope to ultimately associate a particular screen design variable or variables with evidence of improvement in learning.

Guidelines exist outside of the instructional design field which can help instructional designers effectly implement visual elements into screen design. These visual recommendations have been time tested in the art world and are referred to as graphic arts principles. Several professionals in the instructional design field have made attempts to recognize the importance of the inclusion of artistic or aesthetic principles within the design of computer-based instruction (e.g., Martin 1986; Abed 1989; Reilly & Roach,1986). There is agreement among these authors that aesthetics is an important consideration within instructional design. Aesthetics is not only important, it is necessary for effective visual communication. Much of the existing screen design research findings can be subsumed under the general aesthetic arts principles originating in the graphic arts field.

Overlap of Graphics Arts, Human Factors, and Screen Design Principles

Reilly & Roach (1986) integrated principles and research from both the graphics arts and human factors fields. They highlighted the commonality between artistic principles and research results associated with the human factors field. Many conclusions from human factors research could be grouped under categories of the artistic principles of proportion, sequence, emphasis, unity, and balance (Reilly & Roach, 1986). Individual variables explored included such elements as color, arrangement, placement, order and display. The elements and their attributes corresponded heavily with many of the specific graphic arts principles.

Interestingly, when screen design research results and guidelines within the instructional design field were incorporated into this framework, the majority of these recommendations could be grouped within the graphic arts categories as well. This suggests that many of the individual experimental variables associated with screen design may be inherent in graphic arts principles. It also would seem to suggest that since individual elements of screen design have been tested and accepted, the research focus should move toward a broader visual approach. The aesthetic design of computer screens should be considered in the research process and practical application of this area. In order to accomplish this however, the idea of aesthetics must be explored thoroughly within the instructional design field and common definitions needs to be identified. In the following conclusion of this paper suggestions are made to help facilitate this proposition.

Aesthetics and Instructional Design

Martin (1986) states that aesthetics are concerned with feelings and sensory experiences. In her view all art forms share similarities and differences and that these commonalties are of utmost importance. In this vein, computer-based instruction could be viewed as an elementary art form, not yet fully matured but continually establishing its own visual identity. In order to fulfill its primary function, promoting learning, programs need most importantly to engage the viewer. An appealing environment which adheres to aesthetic principles may do much to enhance the learning experience. The visual aspect may draw the viewer in, as an intuitive invitation. It may communicate the content, as well as impart an affective or feeling perspective twhich together may initiate or assist the viewer's learning. It is theorized that the addition of the aesthetic realm to the instructional domain can only enhance the learning experience of computer-based instruction.

Aesthetic quality exists in many created objects and fields of study. Martin (1986), in her appeal to include aesthetics in the training of educational technologists, suggests the incorporation of rich, varied and extensive experiences with a number of art forms. While this certainly would improve artistic sense and aesthetic appreciation of beginning and practiced instructional designers, perhaps it would be beneficial to concentrate on a single related field to encourage transfer of aesthetic concepts.

The field of commercial art lends itself well to the design of computer-based instruction. Many visual aspects can be translated easily from the commercial art field to computer-based instructional design, including the use of fonts, placement of photographs in regard to text, the use of color for attention and the overall goal to entice the viewer and produce an emotional response.

Perhaps because of commercial art's visual qualities and use of aesthetics, it is a field that instructional designers could look toward for guidance in aesthetic design. How well the visual ideas transfer from this medium to computer-based instruction remains to be explored; however, the commonalties of textual, graphical and color elements in both mediums creates a potential shared base of information. Inspiration for design may also possibly be gleaned from award-winning children's book illustrations, sophisticated magazine layouts and effective print advertisements, for example.

This paper has attempted to review screen design research and guidelines present in the instructional design field and propose a broader perspective in regard to the examination of visual elements on the computer screen. Past research has concentrated on individual variables while more recent studies have begun to categorize these variables into larger visual components. The overall aesthetic of the computer screen represents an important instructional element that remains to be empirically investigated.

The commercial arts field offers guidance to instructional design professionals and researchers in defining graphics arts principles which embody aesthetic quality. However, these arts principles should be defined and considered within the instructional design field as to their potential contribution to learning. Implementing artistic principles to improve the aesthetic appeal of screens may offer a more holistic and comprehensive method of testing the impact of screen design on learners. This approach may prove a better method of investigation in this area than prior studies examining individual variables.

Much work needs to be done in this area. Issues remain concerning the creation of a common definition of aesthetics, how aesthetic principles can be properly implemented into the instructional design process, and methods to empirically validate them. This paper is an exploratory attempt to open the dialogue of research and discussion in this area in order to stimulate further thought concerning the present and potential future nature of screen design practice and research.

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White Letters on Colored Backgrounds: Legibility and Preference

Dennis Pett

Introduction

There have been numerous studies of color preference and the relationships between color and legibility that have been reported in the literature. Although there is evidence that color preferences change with age and are influenced by cultural differences and individual characteristics, studies show that cool colors are generally preferred. It is difficult to compare color preference studies because methodologies have varied and the colors used have not been adequately specified (DeSantis and Pett, 1980).

In addition, it is important to recognize the fact that color preferences, as measured in most controlled research studies, may not be related to the preferences that would be indicated in real life conditions where colors are seen in a context. A color that is preferred in one situation may not, and probably would not, be preferred in another situation.

In general, studies have tended to show that acuity is greatest for colors in the middle of the spectrum.

However, most studies did not deal with projected images. Two studies dealing with projected images were found in the literature. Snowberg (1971) reported that when black letters were used on colored backgrounds the order of legibility from most to least was white, yellow, green, red, and blue. These results probably relate to brightness differences between lettering and background. These differences were not indicated. Snowberg also reported color preferences which, from most to least preferred, were blue, green, red, and yellow. These preferences were based on viewing colored chips.

Sanner (1973) conducted a study using black letters on colored backgrounds. The order reported from most legible to least legible was white, green, red, yellow, and blue.

In recent years, white letters on colored backgrounds have been increasingly used for slides; however, no studies of legibility or preference for this configuration have been reported. Similarly, no studies of white letters on colored backgrounds viewed on a cathode ray tube (CRT) have been reported. A study completed by Gustin in 1991 dealt with legibility of, and preference for, projected slides with colored backgrounds and white text. A follow-up study by Cuttill in 1991 focused on the same variables viewed on a CRT.

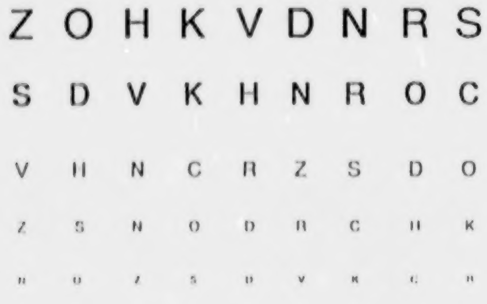
Gustin Study

Fifty adults with normal color vision participated in the experiment. To test legibility, slides with white lettering on red, green, blue, cyan, magenta, and yellow backgrounds with carefully controlled low, medium, and high brightness levels were produced on a slide duplicator (Figure 1). It should be noted that yellow of a low brightness would usually be called brown. The colored backgrounds were produced by using sharp cutting primary color filters, red #25, green #58, blue #47B, cyan #44A, magenta #32, and yellow #12.

B.G. Density ↓	← Hue →					
.44/.45	R	G	B	C	M	Y
.95/.97	R	G	B	C	M	Y
1.67/1.69	R	G	B	C	M	Y

Figure 1

Lettering was produced on a Macintosh computer using the bold Helvetica typeface in the MacDraw software program. The selected letters were limited to the ten letters that make up the Sloan test letters (Sloan, 1951). From the viewing position, the letter sizes corresponded to 20/30, 20/20, 20/15, 20/10, and 20/7.5. The position of each letter on each slide was randomized. Figure 2 shows the lettering of a sample slide.



Z O H K V D N R S

S D V K H N R O C

V H N C R Z S D O

Z S N O D R C H K

Figure 2

Subjects viewed the slides and responded by reading the letters from left to right and from top down. The top six slides, in order of legibility, are noted in Figure 3. A graph of the interactions between hues and background brightness levels is shown in Figure 4.

Slides

Legibility Rankings

B.G. Density ↓	← Hue →					
.44/.45	R	G	B	C	M	Y
	6	3	2	4	5	1
.95/.97	R	G	B	C	M	Y
67/1.69	R	G	B	C	M	Y

Figure 3

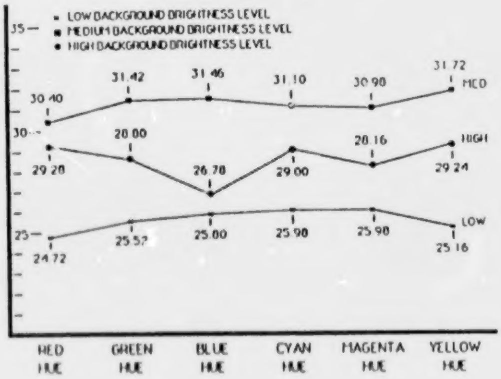


Figure 4

The numbers represent the average number of correct responses for each of the 18 cells (six hues and three brightness levels). A medium background density was significantly better than either a high or low density and a high background density was significantly better than low density in facilitating legibility. Yellow, blue, green, cyan, and magenta at medium background

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densities were significantly better in facilitating legibility than any hue at low or high background densities. Across the three background densities, yellow and cyan were significantly better in facilitating legibility than red or blue, and green was significantly better than blue.

To test color preference, slides were produced with split halves of R, G, B, C, M, Y. This provided 15 pairs of colors. Each pair was produced in two versions with the right-left position alternated for a total of 30 pairs. All slides were produced with the medium brightness range used in the legibility portion of the study. Subjects viewed the projected pairs and reported their preference for one color in each pair. The order of background color preference was cyan, blue, green, yellow, magenta, and red (Figure 5). Cyan and blue were significantly preferred over yellow, magenta, and red. Green was significantly preferred over red.

Slides

B.G. Density	← Hue →					
.95/.97	R	G	B	C	M	Y
Preference Rankings	6	3	2	1	5	4

Figure 5

Cuttill Study

The Cuttill (1991) study followed procedures of the Gustin (1991) study. Background colors were adjusted to match, as nearly as possible, the colors used by Gustin. These would vary slightly, depending on the monitor used. The six colors that ranked best in facilitating legibility are shown in Figure 6. Across the three brightness levels, magenta, blue, and yellow were significantly better than cyan and green, and red was significantly better than green.

C.R.T.

Legibility Rankings

B.G. Brightness ↓	← Hue →					
			4			
High	R	G	B	C	M	Y
			5		3	1
Medium	R	G	B	C	M	Y
					2	6
Low	R	G	B	C	M	Y

Figure 6

The order of background color preference was blue, cyan, magenta, red, green, and yellow. Blue and cyan were significantly preferred over red, green, and yellow. Magenta was significantly preferred over green and yellow (Figure 7).

C.R.T.

B.G. Brightness	← Hue →					
Medium	R	G	B	C	M	Y
Preference Rankings	4	5	1	2	3	6

Figure 7

Observations

It is interesting to note that white letters on a yellow background of medium density ranked most legible in both slide and CRT formats. However, the yellow background was significantly less preferred than cyan or blue in either format.

On slides, all six hues were more legible on medium density backgrounds than on backgrounds of high or low brightness, while on a CRT lettering on medium and low brightness backgrounds was significantly more legible than lettering on a background of high brightness. This suggests that producers should be careful to maintain medium to high contrast between lettering and background while avoiding extreme contrast for slides. This would also be helpful for color-deficient viewers who depend on value differences rather than hue differences to differentiate between lettering and its background.

It is also interesting to note that for both slides and CRT, the preferred background colors were blue and cyan. Green and cyan ranked high for both preference and legibility as background colors for white lettering on slides, but ranked low for legibility on a CRT.

In looking at the overall results of these two studies, it can be said that letter size and adequate contrast between lettering and background are the two most important criteria for producing materials with white lettering on colored backgrounds.

There seems to be no adequate explanation for the differences reported in the Gustin (1991) and Cuttill (1991) studies. Although the hues were slightly different in the two studies, these differences would not seem to be sufficient to cause either preference or legibility choices to differ. Replication of the studies might shed light on the cause of the differences.

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Understanding Visual Information Through Deep Viewing

Ann Watts Pailliotet

Although Marshall McLuhan (1964) claimed that the "medium is the message," it is essential to understand content, processes, *and* forms of visual communication. However, systematic analysis of visual media rarely occurs in most educational settings. A methodology is needed that instructs and assists people to better understand the many elements involved in the visual world around them.

This article will describe Deep Viewing, a research and instructional method used to reach social understandings of visual texts through the use of communal talk, pictorial, and written means. Deep Viewing is based upon Roland Barthes' (1957) definition of a text as not limited to written artifacts, but as any cultural or communicative event.

Deep Viewing focuses upon, but is not limited to, the visual characteristics of a text. The method seeks to make explicit the layers of meaning inherent within visual texts, while it examines features of media as seen, heard, and experienced by the audience, thus providing a practical balance between the "medium" and the "message." Deep Viewing provides a means of practical analysis for any type of visual text, allowing the viewer to discover and construct the many messages within the forms of modern media. This method has application to electronic, print, artistic, and situational texts; it may be used to understand film, television, video, computer programs, art work, print representations or advertisements, and recordings or participant field observations of human behavior. Deep Viewing may be used by educators, students, artists, researchers, and general audiences to examine any visual text.

Theoretical Origins and Premises

Deep Viewing is based on the principles and practices of several disciplines, including education, literary criticism, visual literacy, and the social sciences. Its name comes from Margaret Himley's educational process, "Deep Talk," described in her book, *Shared Territory* (1991). Margaret discovered this method at Pat Carini's Prospect School in Vermont, where it was regularly used to describe students' written texts. Deep Viewing extends Himley's methods for analysis of print to include all visual texts. The method respects both the text and the audience. It assumes that deeper meaning is packed into both participants and text; that this meaning is readily available; and that meaning becomes accessible through structured discussion and response.

The Deep Viewing method is compatible with many contemporary theories and practices in education. It assumes that the creation and analysis of visual texts proceeds in a recursive and ongoing manner rather than as a static or sequential event, so it is in keeping with the premises of process writing theorists (Hairston, 1982). It builds on the assumption that meaning is constructed through transactions between audiences and texts, and shares this perspective with contemporary reader response theory (Rosenblatt, 1976). Because the Deep Viewing method encourages participants to draw from their past experiences, to critically analyze features in the text, and to become aware of their own mental processes of meaning making, this procedure is complementary with the tenets of Whole Language (Goodman, 1982 ; Goodman, Hood, & Goodman, 1991), critical thinking (Marzano, 1991) , and metacognition (Sternberg, 1983). The method accepts that meaning is a constructed through social processes, using many forms of communicational media. Therefore, Deep Viewing uses a collaborative format for analysis (Johnson, Johnson, Holubec, & Roy, 1984), and draws from ideas and practices of educators who identify the interactive natures of all modern literacies (Atwell,1985; Calkins, 1983; Collins, 1985; Dyson, 1984; Emery & Sinatra, 1983 ; Hynds, 1990 ; Sinatra, 1986 & 1990).

The development of critical analysis, exploration of personal response, and acceptance of others' points of view made possible by the Deep Viewing process furthers the growing movement toward multicultural awareness in English classrooms. Sinatra (1990) shows how examining popular media allows students to explore cultural biases and experience a wide variety of cultural perspectives, as well as to develop literacies. Because one of Deep Viewing's approaches to visual texts proceeds from a specific examination of cultural codes, the method is a useful way to help students become aware of and appreciate social differences. The method also enables participants to examine how cultural meanings and values are transmitted through mass media and to acknowledge how these meanings reflect relative, situated social constructions rather than absolute truths.

Deep Viewing also utilizes discourse analysis and draws from semiotic practice. Traditionally, discourse analysis centers upon oral or print language, and semiotic theory examines the signs in written language. Deep Viewing extends these notions to include the language of visual images. Barthes (1974) and Fernande St. Martin (1990) set forth codes or categories to order textual meaning. Deep Viewing also uses a coding system, and although one of its categories examines discourse patterns, it also examines visual factors and how the relationships between textual codes create meaning. Because visual media are highly iconic, or representational , Deep Viewing also draws from the practices of symbolic (Jung, 1956 & 1959) and metaphoric analysis (Lakoff & Johnson, 1980).

This process of examining visual and verbal symbols is compatible with many qualitative research methods in the social sciences, particularly those of the Symbolic Interactionists, who believe that through observing human symbols and behaviors, one may ascertain human thoughts and beliefs (Blumer, 1969; Glaser & Strauss, 1967; Manis & Meltzer, 1972). The Symbolic Interactionists believe that meaning for individuals is both constructed and reflected through the symbols they use in social situations. Deep Viewing helps participants to become aware of how symbols in visual texts both reflect and shape individual and societal beliefs and behaviors.

Deep Viewing furthers the integration of oral, written, and visual communicational competencies increasingly identified as an important part of modern literacy (Sinatra, 1986 & 1990). It synthesizes the work of visual literacy educators and theorists (Adams & Hamm, 1987; Foster, 1979; Kellner, 1988 ; Masterman, 1980; Newcomb, 1986; Reddy, 1990), semiotic theorists (Barthes, 1957 & 1974 ; Silverman, 1983), visual semiologists (Pettersson, 1992; Robinson, 1992; Saint Martin, 1990), and discourse analysts (Goffman, 1974 & 1981; Himley, 1991) into an easily usable classroom activity. The process assists participants to describe and explore meaning, by making explicit the many implicit connotations and connections inherent in both the imagery of the text and in the experiences of the audience. The next section will describe the Deep Viewing method, as it may be applied to visual texts in a classroom setting.

The Deep Viewing Methodology

General Guidelines and Adaptations

Deep Viewing is a three -leveled process. It may best be done in a cooperative learning, Jigsaw II format. Groups are formed to examine one or more categories. Participants are encouraged to write notes and/or draw diagrams as they view and talk. After each level of discussion, groups share their observations with the whole group, thus creating a broad picture of understanding. Extension activities like prewriting, post writing, artistic response, or reading enrichment may be used throughout the levels of inquiry. Responses may also utilize electronic media, like word processing or graphic design, as well as other printed texts, before, during, or after the process.

When analyzing longer texts, participants may determine stopping points for discussion and analysis; in an ongoing event like field work or an observation of a science experiment, participants should concentrate on Level One of the Deep Viewing process, and use Levels Two and Three at the conclusion of the observation. In an observational field text discussion, individuals may share their observations subequently with a whole group; in print, video, film, or artistic texts participants engage in the entire procedure. Deep Viewing may be adapted as needed to create a broad frame for understanding for all visual texts.

There are several points which are useful to remember in a Deep Viewing session:

1. Follow the stated progression to build layers of understanding.
2. It is often useful to designate a facilitator and recorder in each group, especially when learning this technique. The facilitator keeps the group focused on the specific task of each level and makes sure each member is allowed to speak; the recorder takes notes about group comments.
3. For clarity, use "in the text" statements to describe the text. Use "I" statements to express your perceptions, ideas, observations, etc.
4. Teachers may provide prompts as desired. Possible prompts are included at the end of each code in the description of Level Two.

Codes

Form groups according to the following codes:

1. *Action / Sequence* - This group may note events in text through oral discussion, written notes and/or visual devices like flow charts and story boards. They also note relationships of time: when and how long do events take place?

2. *Semes / Forms* - Semes are units of visual meaning that create symbols. This group notes forms in text like colors, objects in a setting, textures, and icons. This group also notes the appearance, types of dress, and features of actors. They note repeated, emphasized and contrasted objects, i.e. objects that are paired with other objects; lightness with darkness in a film , or objects that reoccur throughout the text.

3. *Actors / Discourse* - Although actors are forms or symbols, this is a separate category for purposes of analysis. This group examines what the characters/actors say. They note words and phrases that may sum up main ideas or themes, repeated language, terms particular to a group, or language that seems out of place.This group also notes what they hear the characters say in the oral / aural text: tone, rate, pitch of voices, and the lyrics of songs in a production.

4. *Proximity / Movement* - This group examines all movement : gestures and movements of characters / actors and other forms. They note: vectorality (where objects or actors move) , relationships (how the forms move in relation to each other), dimensions and relative sizes (does one form dominate by standing in front?)

5. *Culture / Context* - This group notes symbolic and discourse references to cultural knowledge like science, art, educational practice or popular culture . They answer the questions: What is referred to ? What is implied? What is missing? What sorts of hidden messages do these references convey and what cultural perspectives or biases do they create in the mind of the viewer? This group also locates the text in particular historical and social contexts. They look for clues that reveal who made this text? When? Why?

6. *Effects / Process* - In commercial texts, viewers examine "artistic devices:" the use and repetition of techniques, quality of visual and sound effects and musical accompaniments, camera angles and technological enhancements, etc. In less sophisticated productions, viewers examine camera or observer angles, noting what is seen and missing, and posit how perspectives influence understanding. In print texts, they examine the devices used to structure the text, interest the audience, and further the author's purposes. In field work or naturalistic observations, they seek to understand how the observer's perspective and participation affects understanding and outcomes. This group should also focus on the quality of the text: e.g. How do factors like sound, angle of perception , and focus affect meaning?

First Level : Giving Voice and Summarizing

Groups are formed according to the codes. Facilitators, recorders and reporters are selected. In a group setting, students focus on one category or code, using a variety of responses, including talk, writing, and pictures. Teachers may use additional questions that may direct or assist inquiry as desired (e.g. questions about a particular strategy like persuasion, a specific issue like stereotypes, a theme being stressed in readings, or guided inquiry into connections between the current text and others). For very small groups, ask participants to observe more than one code. For individual observations, create a paper with six vertical columns and record relevant observations under each heading as the observation proceeds. Level Two and Three analysis may be done by individuals through written analysis or subsequent talk with others.

Procedure:

Watch the text. Take notes or draw pictures of aspects which you notice, questions that puzzle you, and observations about your topic - observe within your group's assigned focus or code.

During this level there is no cross-talk in groups.

1-1. Go around the table in your groups, each reading aloud your notes about what you have seen and heard in the text. This level is literal. Describe only what you perceive in the text - interpretation will come later.

1-2. Summarize. Remain brief, but remain as true as possible to what *each reader feels or perceives* is the main point of his/her observation.
1-3. Each group reports their findings to the whole group through oral, pictorial, and/ or written means .

Second Level : Making Observations

Teacher models different strategies for response (underlined below). Any of the strategies may be used for any of the codes. Remind students that these strategies may also be used for any text - print, situational, or electronic. Encourage students to draw upon their personal experiences and prior knowledge as they watch, talk, and write. Stress to students that with visual texts, as in literature, there are no single "right answers," but a range of possible interpretations. Often, some of the responses drawn from codes will begin to overlap at this level, as participants begin to discover relations between elements in the texts and their observations about them. This overlap is desirable. Teacher prompts may be created and used throughout Levels Two and Three as needed. Some examples of prompts are provided.

During this level there is no cross-talk in groups until each participant has had a minimum of three uninterrupted turns to speak.

Procedure:

2-1. Go around the table in your groups again, but this time each viewer makes an observation. These observations should be based upon explicit aspects of the text. Note what is present in the text and what is missing. Begin with observations that are readily apparent and move to more inferential levels as you continue.

Action / Sequence - Conclusion: "The action continued longest during X scene--over three minutes . We must then posit that this is important for meaning."

***Teacher prompts** : Is the time sequential or random? Does the action move around different time frames? What have we read that most closely parallels the time sequences in this text? How do we know what time it is? Why do you think the creators used this particular time development? How might the meanings in the text change if the time sequence were different?

Semes / Forms - Observation: "The symbol of X was repeated four times throughout the text." Compare /Contrast : "The image of Y was often paired with the image Z ." Questioning: "What are the connotations of a symbol X?" " How do these two symbols convey possible antithetical meanings?" (e.g. of freedom versus entrapment, goodness versus evil, etc.)

***Teacher prompts:** What symbols or objects were repeated most? Which ones were paired? Why? What feelings, memories, and thoughts do you associate with these symbols? In what other texts have you encountered these symbols? What might they mean to a person from a culture that is different than yours? What did you expect to see that was missing? Why do you think the creators used these particular symbols? Would you use the same ones? Why or why not?

Actors / Discourse - Connecting: "The characters repeat the phrases and words, '........' When one reads repeated lines in poetry, these lines are often used to emphasize meaning." Identifying communicative purposes: "How do these repeated words further the purposes of the text?" Noting what is missing: "Why doesn't this text contain references or language about A, B, or C? I'd expect them to be there."

***Teacher prompts** *:* What are the connotations of repeated words and phrases in the text? Why do you think the creators chose these words? What other words could they have used? How might using other words change meaning? What were the tone and mood of the characters and text? How do you know? How are tone and mood conveyed in a print text?

Proximity / Movement - Noting context: "In this scene, Character A stands between character(s) or object(s) B and C. Forming hypotheses: "This relationship may foreshadow coming action; it may indicate how humans are always choosing between alternatives.

*** Teacher Prompts**: What are the relations of objects and what do these relations suggest to you? Why are certain images closer to the viewer while others farther away? What does this suggest about their relative importance? What moves and what doesn't? What do ideas of movement and stillness suggest to you? How is movement or lack of movement used in this text to further plot, characterization, and mood? How are these devices used in literature?

Culture / Context - Observing: Common cultural codes are noted like historic, scientific, artistic, and literary references, or allusions to current events and famous people: "The text contains four references to science." Remembering: "In the news last week they reported that this theory had been disproved." Projecting: "If I were to make this text, I would..." Locating Context: "The characters refer to X historical event, are dressed in a particular style, and use several slang words that lead us to believe this film was made during the late 1950's." Identifying perspectives: Cultural allusions often convey hidden stereotypes and cultural biases. They also often reveal who is the perceived audience from the perspectives of the senders of a message. "The makers of this text seem to present women in submissive roles. How does this reflect the norms in 1950? Is this how people think today?"

*** Teacher Prompts**: How do these references reflect the dominant views of U.S. culture? What assumptions are the senders of this message making about us and the greater society? Do we agree? How do they depict certain groups of people? Are these accurate portrayals? What sorts of words and images reveal stereotypes? How do you feel about these images?

Effects / Process - Noting artistic devices and possible motivations: "Why is this subject viewed from below? Does this connote respect or power? How do the special effects enhance or detract from the text? There are few reverse shots in this sequence. Why does this medium utilize the forms and processes it does?" Noting visual devices : "In the beginning of the text the camera is out of focus or pans in from a wide shot to a narrow shot of the main character. How is this like foreshadowing or development in a novel or poem?" Personal observations and reactions: "How aware am I of how devices are used? What responses do I have to them?"

***Teacher prompts :** How many different angles and effects can you identify? How do these devices capture the viewer's interest? What sorts of devices were used to develop the story? How are they used? What devices are used to create feelings in the viewer like suspense or tension? What devices are used to create fast action? Slow action? How are these devices like those used by authors in print texts? How do they differ?

2-2. Talk at this level continues until readers agree that their observations are complete and they are ready to move into the third level. Groups again stop and share their observations with the whole group.

Third Level: Inferences, Assumptions, and Evaluations

During this level there is no cross talk until each participant has had two uninterrupted turns, then viewers may talk in any order and question each other. In this level, participants should start with their code focus, and then may progress to a discussion of the other codes.

Procedure:

3 -1. When groups begin making broader inferences about the text's meanings, this level will have begun. Besides broader and more speculative inferences, the participants will now indicate their likes and dislikes about aspects of the text. Viewers may compare or contrast this text with others, draw upon personal experiences, or express collective perceptions in their discussions about the text. Participants should also speculate and pose questions about the text. Discuss these questions and responses in your groups. Be explicit about textual and personal connections . Say "I" when expressing an opinion or observation; say "in the text," when expressing perceptions of what you noted at the literal level.

At this level, the codes often begin to overlap, as participants draw from the findings of other groups. Participants are now free to make connections between their own observations, those of their code group, and those within the classroom. Participants should also speculate and pose questions about the text, relating it to their own experiences, expectations, feelings, and knowledge to what they have seen, heard, and written. Often, at this stage, larger themes and connections are made. All participants should have ample opportunities to listen and respond. There may be breaks in the group conversations. Facilitators should allow these reflective pauses in order for participants to assimilate and formulate ideas. Questions and responses are discussed in the groups until members agree that the topic has been exhausted, and then groups report back to the whole group describing findings they see as particularly interesting or important.

NOTE: The Facilitator should be alert at this level, to keep participants on task.

3 -2. Groups identify questions and general themes. Report findings back to whole group.

Further Applications and Conclusion

In the past year, Deep Viewing has been used by middle school students in California for analyses of films and newscasts, previews of textbooks, and an examination of how commercials use persuasive strategies in order to sell products. In New Mexico, high school students Deep Viewed print advertisements. They discovered that certain images, like colors and objects, are used by both authors of literature and sellers of consumer goods to hold audience interest and further communicational purposes. In New York, a group of university level, textual studies students used the method to watch *The Wizard of Oz* . These sophomores, who often approached textual analysis with tepid responses, were engaged and on task throughout the session. They provided diverse interpretations and novel perspectives of this familiar classic: the existence of Jungian themes, its depiction of the monomyth or hero's quest, its contrast of Christian and pagan imagery, its depictions of cultural stereotypes, and issues of gender the film raises.

Last fall, the Deep Viewing method

was used by teacher candidates to create anecdotal records of students in the classroom and to analyze tapes of their initial classroom experiences. Through an examination of what they said and did, as well as the objects and events in their classrooms, many were astounded to see the cultural assumptions they made and the implicit biases they exhibited within their lessons. The Director of the teacher education program at my University remarked that she had never seen such insight in novices, and attributed this reflective capacity in part to the Deep Viewing training they had received. She is now requiring training in the method for all future candidates. The method has been also been employed by experienced teachers to analyze video tapes of classroom teaching situations, and by faculty at a nearby college as a way to observe student teachers. These participants found value in the method, because it enabled them to examine their own and others' teaching practices in a systematic way. They also noticed aspects of their teaching they had overlooked in the past.

Recently, I have used Deep Viewing to examine films, analyze print and televised commercials, review children's picture books, evaluate computer software, and as a method of observation in my dissertation field work. My husband, a photographer, recently used the method as a way to analyze his pictures, in order to explain them in a written narrative. A science teacher friend of mine now wants to teach the method to his students for observation of experiments.

Deep Viewing also provides a systematic way for researchers and observers to order events and understanding in classrooms and field work. By breaking down the component parts of experience into codes or categories, researchers may gain insight about themselves, the participants and settings which they examine, and the greater implications of their work.

Because Deep Viewing involves reading, writing, speaking, listening, thinking *and* viewing, it offers a way to connect communicational worlds and extend the competencies of our students both in and out of the classroom. Although no instructional strategy is perfect, Deep Viewing has much to recommend it. It is a method which may be used and adapted for a variety of contemporary texts. It shares a common stance with much of existing educational theory and classroom practices. It promotes active participation, critical analysis, and awareness of participants' culturally based assumptions about themselves and others. It is motivational, because it links students' personal experiences to classroom instruction.

With Deep Viewing, teachers may create a powerful connection between classroom material and the students' lives, teaching and reinforcing communicational competencies. I have found that participants enjoy Deep Viewing , tend to stay on task during the process, and often exhibit increased academic and social skills which carry over from the examination of popular texts into traditional study. Deep Viewing is a practical tool that furthers our understanding of both the media and the messages of visual texts.

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Screen Design: A Review of Research

Prachee Mukherjee
Gerald S. Edmonds

Introduction

The 1980's heralded the arrival of desktop publishing, which allowed a vast number of people to publish newsletters and other documents without being cognizant of text and graphic design principles. In 1993, one does not have to look far to find computer interfaces and screens that generate 'noise' and hinder instruction and the communication of messages .

While there is research documenting the positive impact of presentations done with visuals versus those done without, specific, empirically validated (both quantitative and qualitative data) information on the design and use of visuals in instruction is not available as a coherent body of literature. The importance of visuals in instruction is only recently beginning to receive widespread attention. This paper focuses on screen design, a specific type of visual display, that is becoming increasingly important as more and more computers are used for instructional purposes. The scope of this paper is limited to a review of research on screen design used for instructional purposes. The paper begins by defining screen design and its foundations, then examine its functions, review screen design research and problems, suggest criteria for evaluation, and conclude with a critical summary of where the field is, and future directions.

Defining screen design

Defining the phenomenon under investigation can help to determine the scope and purpose of study, to identify the important relationships to be examined, and to suggest criteria by which to evaluate an example of the phenomenon. There are a number of terms in use that all refer to screen design. Some variations are screen layout design, computer based instruction (CBI) screen design, text layout, and screen layout. In a review of the literature, we found only one study that offered a definition relevant to the context of instruction: "The purposeful organization of presentation stimuli in order to influence how students process information" (Hannafin and Hooper, 1989, p. 155). Broadening and detailing this definition somewhat, screen design is defined as the coordination of textual and graphic elements to present sequenced content, in order to facilitate learning.

This definition, in directly linking screen design with the desired effect on learners, provides a functional approach to screen design. It allows one to focus on whether the screen design under consideration is actually providing conditions of learning. More importantly, it establishes the relationship of screen design with *learning* and learners, setting apart the field of screen design in instruction from screen design in information studies. In information studies or related fields of investigation, screen design is concerned with the 'user' and issues of usability, as opposed to the learner and learning. The shift in the nature of the situation is from searching to learning.

Foundations of Screen Design

Hannafin and Hooper (1989) identify three foundations of screen design: (1) psychological, (2) instructional and (3) technological. The psychological foundations of screen design form the empirical basis for screen design, focusing on issues related to perception, attitudes, and information processing abilities of learners. The instructional foundations are issues related to instructional, rather than cognitive/learning problems. The learner, content and instructional setting are all analyzed under instructional foundations. Technological foundations provide the possibilities and limitations of instructional technologies. (Hannafin and Hooper, 1989)

In addition to the foundations outlined above, a fourth one, aesthetic foundations, derived from art and design, also inform screen design principles. Although not always explicitly named as such, screen design principles influenced by aesthetic considerations, take into account how various elements should be combined for visually pleasing effects.

The design of computer screens has traditionally fallen to the individuals or teams programming and developing instructional software, who typically do not have a background in either graphic design or visual literacy theory. Galitz (1985) notes that technical features received greater attention than the human factors involved in processing the displayed information (p. 2). As a result screen design has "...tended to be unsystematic and inconsistent, and has failed to adequately reflect human perceptual and processing capabilities" (Galitz, 1985, p. 2). Early screen designers applied graphic design elements used in the creation of paper based documents, disregarding important differences between computer screens and pages (Table 1).

Screens	Page
Information written anywhere at any time	Page is frozen
Dynamic nature of text • animation	Information static • no animation • info cannot be rewritten
Time dimension • slowly or quickly	Information is only presented once
Information tied to display	Information tied to paper but can be taken away from site

Table 1. Screen vs Paper

Much of the screen design literature presents strategies for screen design, without linking the strategies to research evidence or experience. General heuristics on all aspects of screen design abound, but these too, are not grounded in research or instructional design principles. Misanchuk (cited in Grabinger, 1993) notes:

> While aesthetic guidelines exist to help designers create attractive displays; ...aside from Hartley's (1978) work, there are few, if any, empirically based guidelines to help instructional designers combine text elements in ways that facilitate learning (p. 35).

The use of screen design to provide a bridge between information and learners adds a layer of complexity to the design of instructional screens:

> CAI designers need more than aesthetic guidelines. They need guidelines that are focused on learning, guidelines that will help instructional designers create displays that facilitate the process of reading and learning – the acquisition, organization, and processing of information by learners (Grabinger, 1993, p. 36).

The focus on compound elements used to enhance comprehension and learning dictate that a set of screen design guidelines should "...go beyond legibility standards and indicate what designers should do to enhance the process of organization and integration" (Grabinger, 1993, p. 36). Single elements and the numerous combination of screen and software elements make conducting research on screen design daunting. Single elements like bolding a word, by itself, most likely do not impact learning (Grabinger, 1993). Grabinger (1993) comments that the combination of single variables into complex elements used to organize a display, chunk information, or structure information may affect how a learner perceives, comprehends, integrates and processes information.

Elements of Screen Design

There are a number of elements which are available in comprising an effective screen. Heines (1984) divides the screen into a number of functional areas, for example navigation, which allows for the consistent placement of certain combinations of elements (such as forward and backward buttons) from screen to screen. Examples of functional areas (Figure 1) include, but are not limited to, orientation, directions, feedback, student options, text areas and video areas.

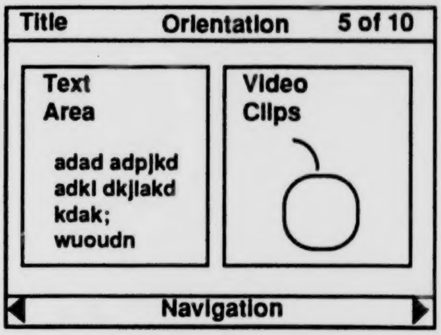

Figure 1. Computer Screen Divided into Functional Areas

Screens are also comprised of numerous graphical icons and symbols which guide the user, but at the same time, remain unobtrusive (Heines, 1984). Graphical symbols include buttons which perform some action when they are activated. The use of icons representing commands/actions should be derived and based on images that make sense to the learner and not to the screen designer alone (Edmonds, 1993). Often, certain icons are included, whose functions are not intuitively apparent to the learner.

Screens also display text which include a number of features including message clarity and message readability. The designer can manipulate type style, line length, justification, break points, and character attributes (such as bolding).

Functions of screen design

Galitz (1985) notes that research on screen design preferences reveal that users want

- an orderly, clean, clutter-free appearance;
- an obvious indication of what is being shown and what should be done with it;
- expected information where it should be;
- a clear indication of what relates to what (headings, field

captions, data, instructions, options and so forth);

- plain, simple English; and
- a simple way of finding what is in the system and how to get it out (p. 38).

Good screen designs are expected to fulfill a number of requirements (Heines, 1984; Hannafin & Hooper, 1989; Grabinger, 1993), as described below:

- Focus learners' attention: The screen should be designed so as to focus learners' attention on relevant lesson content.
- Develop and maintain interest: It is the function of a good screen to motivate learners to expend the necessary effort to undertake the learning task. Emphasizing two-way interaction, Heines (1984) suggests that "students should be drawn into the subject matter" (p. 133).
- Promote deep processing: In order that learning and encoding occur, effective screen design must allow learners to integrate new content into their schemátas. Successful screen designs facilitate appropriate interactive processes (such as reading and perception) (Grabinger, 1993, p. 36).
- Promote engagement between learners and lesson content: Engagement is described in terms of quality and quantity (frequency) of interaction between learners and content. Engagement results from a balance between "easily accessible learner-based 'tools,' and designer-based techniques" (Hannafin and Hooper, 1989, p. 159).
- Help learners find and organize information, and facilitate lesson navigation: To eliminate or minimize learner frustration, effective screen design aims at establishing and consistently following certain protocols to orient learners, such as using functional areas (Edmonds, 1993; Grabinger, 1993; Heines, 1984). This prevents learners from getting 'lost' or stuck in a loop, helps them to navigate successfully through the lesson, and also, to fully devote attention to content processing (Hannafin and Peck, 1988; Heines, 1984; Kerr, 1983).

A well designed screen: (1) reflects the needs and idiosyncrasies of its users, (2) is developed within the physical constraints imposed by the terminal, (3) effectively utilizes the capabilities of its software (Galitz, 1985, p.37) and (4) achieves the instructional objectives of the program for which it is designed.

Those who focus on screen design functions from a non-instructional design perspective may sometimes pay attention to learner needs and characteristics such as memory and perception, but only at a superficial level. For example, Galitz (1985) points out that screen designers should keep individual differences in mind, but fails to explain how that would specifically affect design strategies.

Screen design research and problems

A number of factors make screen design research problematic:

- An innumerable possible combination of elements of screen design exists. Additionally, even when it is known which elements have been combined, the overall effect of the combination is not equal to the sum of the effects of each individual element.

Grabinger (1989, p. 179) aptly names this overall effect the visual 'gestalt.'

- Many screen design elements are physically invisible, as are learning processes. For the latter, one must fall back on inferential speculations on the nature of learning processes employed. Research methods tend to be comprised of student self-reports or post-lesson interviews with students (to identify macro-processes employed, or effort expended by learners).

- Changes in screen design, as well as effects of screen design, can be very small or negligible. Although pre-post research designs have been employed (to train students in specific strategies and then testing them later to measure the impact), it remains difficult to measure such small effects with any success.

As noted earlier, there is a lack of research on screen design and its effects on learning. Even studies that claim to provide guidelines based on research findings such as Aspillaga's (1991), make screen design recommendations based on research done with a non-electronic medium. Galitz (1985) mentions in the introduction to his book on screen design that his guidelines are based on experience, research findings, informal studies, and "known" psychological principles; however he does not care to disclose which guidelines are derived from which of these many sources.

Broadly speaking, research in this area either consisted of comparison studies (with some other non-electronic teaching method), or evaluating whether or not lesson objectives were achieved (Hartley, 1978). A third kind of research focuses on studying the effects of manipulation of screen design elements on learning. In experimental research, there have been two approaches: (1) those that investigated the impact of single elements of screen design on learning, and (2) those that investigated the impact of multiple elements (or combination of elements) on learning (Grabinger, 1989).

In the experiments conducted by Grabinger (1993), the screens are separated from the context and content in which learners will encounter them in real life. The problem with such studies is discussed by Neuman (1991):

> Reality ... is indivisible as well as multiple. Residing wholly in an individual's mind, reality can not be fragmented into variables to be studied in isolation. Separating any part from the whole invariably alters both the part and the whole; studying only discrete parts therefore distorts the reality we seek to understand. (p. 41)

In the case of screen design, the 'whole' is comprised of the interaction between the screen, content, media, learner, and context (Figure 2).

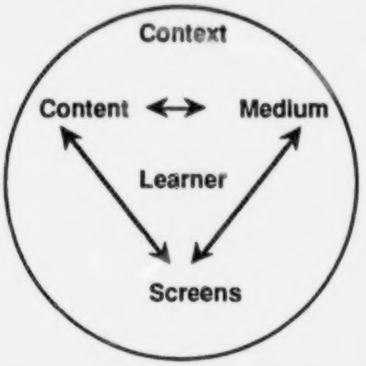

Figure 2 The Learner/ Computer Interface

Criteria for evaluation

Given the research and scope of screen design, are there any derivable criteria on evaluating effective screen designs? The criteria suggested by the functions of screen design relate to:

- orienting learners
- encouraging deep processing
- focusing attention
- engaging learners

All these criteria can be considered along the dimensions of quantity (or frequency) and/or quality of interaction.

Hartley (1978) suggests that electronic text can be evaluated in a number of ways, for content, typography, and teaching effectiveness. For assessing teaching effectiveness, he advocates looking closely at readability, and suggests a number of ways for doing so.

Discussion

At present, screen design seems to be guided by principles derived both from research and common-sense heuristics. The major difference between the two is that common-sense rules all tend to cluster around issues of learner orientation and information presentation. This is done at the cost of neglecting instructional aspects, such as ensuring that certain cognitive processes are employed. Using Hannafin and Hooper's ROPES framework, which is comprised of Retrieval, Orientation, Presentation, Encoding, and Sequencing (1989) respectively, most of the intuitive rules for screen design that are not grounded in research tend to overlook Encoding and Sequencing. Additionally, many screen design guidelines are generalizations from research done on non-electronic medium such as print. The conclusions about screen design tend to remain stuck at the word-level, rather than examining macro issues (Isaacs, 1987).

However, both these approaches to screen design tend to share one feature and that is the placement of the learner in the process of screen design. In both instances the learner encounters the screen, after the design is complete, to provide feedback on how well a design element or combination of elements, already constructed, works. The learner's input is sought *after* the fact; after the screen has already been designed. This needs to change in view of other changes where media and instructional technology have become increasingly interactive. The emphasis should shift from screen design, a passive concept, to human interface, a more dynamic ongoing process, better reflecting the interactive technologies of today.

There is a need to deepen and expand our knowledge of the manner in which screen elements embedded in instructional courseware actually perform in daily instruction (Neuman, 1991, p. 39-40). There is a critical need to understand the particulars and nuances of the relationship of screen design elements, context, and content, to learning and knowledge construction by learners.

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A Dialogue About Mythological Symbols from the Campfire to the Digital Age

Barbara Seels
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This paper starts by explaining what myths are and the functions they serve. Then, mythology and mythical symbols past and present are compared. Changes in the nature of mythological symbols are explored through a dialogue between an artist and a media producer. During this dialogue the importance of the study of myths as symbols in an age of global and digital communication becomes apparent. The idea that a world mytholdology may evolve from media experiences is introduced. However, to understand this premise the reader needs to know what myths are and how they relate to symbols.

A myth is a fictitious story which explains the meaning of life. According to Joseph Campbell (1988), it is a way to experience life. He was convinced that the common themes or archetypes found in stories and images were universal despite cultural variations (Cousineau, 1990). Myths and symbols of myths are not the same. Mythological stories often generate pictorial symbols which represent themes or aspects of myths. These stories helped early cultures to explain the patterns of events they observed recurring in their lives. Today these patterns may be interpreted by scientific or mathematical reasoning instead of stories.

The themes of myth remain constant throughout time and space, but the texts and images in the stories vary according to cultures and periods. In addition to cultural differences, there are variations in personal responses to myths. People create personal symbols as well as symbols that communicate to others. Myths are accessible through many symbolic referents, but to "read" these symbols one needs adequate and appropriate education, education which deals with the mythological meanings imbedded in images as well as with the words of a mythical story. The traditional form for myths is linguistic, but myths are also found in pictorial forms of language. To be mythologically literate it is necessary to be able to decode meanings in contemporary images as well as in stories.

Mythic knowledge helps us understand the connotations of symbols as universal messages.

> "Meaning is always broadened and endowed with great sensory power by myths.... Mythical consciousness accepts only ultimate truths.... Myths connect us directly to a lofty, universal ideal by speaking and reasoning with us in tones colored by passions and feelings" (Biro, 1982, p. 75).

To be literate in mythology we need to understand myths in contemporary form. We need to be knowledgeable about the universal ideas of myth so that we may interpret the symbols of our world. To be mythologically literate means to look for the mythic dimension in the various images provided by our culture. The world as seen from space may have a mythic presence, but only to those who are aware of the mythic dimension of that image. If one is aware of mythic connotations, this meaning dimension is readily apparent because "The allusionary base...is the generic term for the stock of meaning with which we think and feel" (Broudy, 1988, p. 22).
Mythical understanding is a critical component of this allusionary base.

The person who is not literate in terms of mythological themes and images may see only parts and not the whole which exists through the interaction of meaningful interrelationships. Roland Barthes (1985) raises the problem of not being able to decipher the code that explains the relationships among images. When life was simpler and cultures were more contained, mythic literature was manageable because it was limited to what was of most concern to everyone in the culture. The stories were simple and direct. Today's stories and images are complex composites that may borrow from many different mythic sources.

Today we have access to mythology from many cultures and in many forms. On the one hand, the spread of mythology beyond the campfire makes our mythic understanding richer and more connected, but on the other hand our mythic knowledge may become confused by the scope of the allusionary base. There are dangers associated with the worldwide representation of mythology. Both oversimplification or overwhelming complexity can affect the understanding of mythological meaning. There are two real dangers: one is that we will try to find mythological import in every image and the other is that no mythological meaning is perceived because the image is taken literally. The phenomenon of the television show Beverly Hills 90710 is an example. Because adolescent viewers accept it literally, a distorted view of adolescence can develop. If it is seen as having mythological implications, it is interpreted as having symbolic meaning and is less likely to be harmful. The result of the literal interpretation can be an assumption that this is what teenage life is like in the United States. Hans Blumenberg (1985) warns us about "manufactured myths" which do not have the significance of genuine myths but which try to evoke the dignity of myth in association with emotionally laden images, slogans of racism or charismatic leadership (p. xxvi).

Consistent with the oral tradition in which myths originated, the dialogue will be used to explore the ramifications of the changing role of mythological imagery. The dialogue presents two views on the role of visual literacy, that of the artist and the media producer.

★ ★

Artist: Do we agree on what a myth is?

Producer: I'm not sure. I use the word in two different ways--to describe a type of story and to mean a false assumption. Are both meanings necessary to explain the role of mythology in visual learning?

Artist: Actually the meanings have changed over time. In the past, myths were stories that helped explain other unexplainable phenomena. But today when we use the word we are usually referring to the erroneous or false assumptions that we call myth.

Producer: Originally they were used educationally. Plato believed the child should be educated through myths. Myths were accepted as important stories even though they were known to be untrue. Myths are supposed to be imaginary, fantastic, and unreal. Mythical worlds are full of unicorns, mermaids, gods, sirens, ghosts, dragons and humans in bird form.

Artist: These forms are unreal, but there is always an element of truth in their function. Myths were our ancestors' way of reconciling conflicts between the known and the unknown. The Greek word "mythos" meant things spoken which represented events. The Gothic form of mythos, was the word "mandjan" which meant to remind.

Producer: When I think of the word "myth", I often think of the word "mystery". Perhaps they are ways of explaining mysteries. I also think of the word "transformation". A myth is an imaginative transformation. It's a creative product. What's your favorite myth?

Artist: Modern myth or historical myth?

Producer: Either? Both? If I know something about the myths you identify with, I know something about you, your self-concept or sense of identity.

Artist: In that case, be my guest. You go first.

Producer: I like Disney's story of The Little Mermaid. I think it will become a modern myth because it portrays the emotions that accompany the changes from adolescence to adulthood. It reminds me of my youngest daughter who is a competitive swimmer with long flowing hair. She's very emotional and sings the songs from *The Little Mermaid* all the time.

I guess my favorite modern myths would be myths about individuality, such as frontier myths of colonial or western times. It's fun to go to Disney World because so many mythical stories are portrayed in Frontierland and Liberty Square. There's the Hall of Presidents, Tom Sawyer, and Wild West Revue. I guess that tells you something about me already because I like to go back to another century and leave this one behind. I'm not very interested in futuristic myths.

Artist: I'm not sure what that means. Perhaps you're more comfortable reinterpreting the events of the past than anticipating the future. I like the myths that are stories specifically designed to help children cope with their lives. These are stories referred to by Bettleheim as folk fairy tales. A purist might disagree with categorizing fairy tales as myths, but we're using the term in the broad sense, aren't we? These fairy tales or myths offered children material that helped them form concepts of the world's beginning and of the social ideals they could pattern themselves after. In these stories they went through trauma, but they survived and remember--they lived happily ever after. The child inherently realizes that these stories are about inner processes not about the outside real world. Take the story of Cinderella. She went through a transformation didn't she? I like the myths of transformation. That's why I like butterflies which, by the way, are the symbol of Psyche, a Greek goddess - a mythological character.

Producer: Freud would say our favorite myths represent our fantasies, our wish fulfillment.

Artist: But aren't myths more universal and social than individual? Jung's idea of the collective unconscious represented by archetypes connects all of us in a mythic frame.

Producer: I think myths are very dramatic, and there has to be the suspension of disbelief you need with all drama in order to fully experience the recreation of life. Myths are stories which are essentially non-visual. But mythic stories often gave birth to rituals which are multisensory. These rituals provide perceptual experience which is used by artists as the basis for their art. The art in turn becomes a visual reminder of the myth. This circuitous "connectedness" between myth and art gives a meaning dimension to many works of art. Myths are transmitted orally until someone translates them into a visual form.

Artist: Do myths change meanings when they are represented by artists in visual rather than verbal form?

Producer: To some extent, but a picture can still present the drama of a story. Most great communication is story telling.

Artist: Myths evoke images in the mind. Much of our visual language comes from mythic symbols.

Producer: Like Yin and Yang.

Artist: Yes, And there are other circular images of wholeness. There are mandalas from the Far East, sun masks from American Indians, sun discs from Polynesia, and rose windows in cathedrals. They reflect both the whole external world as well as the internal one, the psyche. In fact, a common theme in myths is a search for identity, for one's place in the world. Long ago Odysseus went on his quest, and today we find that modern myths often have a quest to find one's self as a theme.

Producer: They say there are only a few basic plots or themes that dramatists have varied throughout centuries. This is true of myths, too. Different cultures develop different symbols to represent customs, norms, beliefs, but the themes, the "metastories", are the same across cultures. They are universal.

Artist: What are they? What do myths from the Orient have in common with myths from South America? What do medieval myths have in common with modern myths?

Producer: There are themes that have to do with life and death. They often come from hunting or planting cultures where the cycle of growth is important. There are themes that have to do with relationships between male and female or adult and child. I guess the themes I prefer have to do with ages of development, like childhood or adolescence, and the journey through life. I like modern myths like Horatio Algermore than ancient myths about God and mortals.

Artist: Don't forget about the myths with quest themes like King Arthur's Knights of the Round Table. They're journeys through life, too.

Producer: There are mythic roles also. One role is of innocence. It's very arcadian. The other role is of cleverness. This is sometimes the role of the trickster. These roles often represent good and evil. That's the nice thing about myths. They simplify our moral dilemmas. Some of my favorite myths are from the Northwest Indians who believed animals could transform themselves into humans and back again and while doing so could change roles from powerful characters to weak ones and back again. In doing so they confused people. Those who didn't know the story didn't recognize them and suffered the consequences of trusting foolishly. Read some of the Raven stories.

Artist: Every culture has characters that have archetypal meaning. They enlarge the story of our lives by bringing enrichment, excitement and meaning to our individual experience. They help us comprehend our human limitations.

Producer: They also give us guidelines for living that help us resolve conflicts with ourselves and others. This is one of the powerful purposes myths have had through the ages.

Artist: The mythical image is very important because it's born out of a confrontation with reality leading to a search for meaning. The story represents a truth of life, but it's in fantasy form so we can handle it, no matter how serious the topic.

Producer: I think myths enable leaders to lead us and artists to speak for us. Greek civilization and art depended on common ideas, held by all. Visionaries clarify and build on myths. Until leaders find new mythic visions we accept, they will have trouble leading us.

Artist: I have doubts about myths moving into the political arena. Perhaps the political arena is a myth in itself. The role of advertising in this mythmaking effort should be examined. I question the ethics of consciously creating contemporary myths for controlling people.

Producer: Myths have always been in the social arena; so they've always been in the political arena.

Artist: Historically, myths were given visual form to help people reflect on their life experience. Today it seems our myths in visual form are designed to evoke non-reflective responses. When you receive a letter telling you by name that you are a finalist in a $10 million sweepstakes, the sender doesn't want you to think about it.

Producer: Some people may consider that letter a lie, not a myth. Others might say it's a modern myth that evolved from mass media. Do you believe our myths are still forming?

Artist: What do you mean?

Producer: I think that the world is in a time of transition. There are so many images everyone sees, images of the world from space and of the environment, images of people rebelling for freedom around the world. We don't know yet how people will synthesize these images. Myths may spontaneously result either through media coverage and criticism or media productions. In the past, after a myth evolved artists often created mythic images. It's hard for me to believe we won't have a world mythology from media experiences.

Artist: Yes, I think through media all of us have contact with the symbols of today's world. The problem may be with interpretation. Interpretation of images is a skill which must be learned.

Producer: What about power myths? I've always thought Barbie, Rambo and Superman were modern power myths because they were symbols of extraordinary power.

Artist: Yes and so was James Dean. But these examples are very shallow and superficial. They're hollow myths. They're mythological symbols, but they don't represent well developed myths.

Producer: There are some attempts in the media to create persona who deal with universal truths and who have more depth of character.

Artist: Maybe. Our old myths were usually of heros. But today seems to be the age of the anti-hero, of the myth of the common man. What mythic role would we assign to Marilyn Monroe? what about celebrities such as John Wayne? Is he a mythic hero.

Producer: I think so. There's a famous thesis in American history by Frederick Turner that's called the frontier thesis. It's fallen into disrepute but was very popular at one time. Turner said the idea of the frontier was essential to the American character. That whether an American experienced the frontier or not, it was part of our mythology and led to values, such as individuality. John Wayne is certainly the archetype for that thesis.

Artist: There are a lot of myths in history that influence our behavior. Just look at the number of frontier myths alone. Davy Crocket was no paragon. Gunslingers killed few in the west. There are so many myths about Indians, or I should say, Native Americans.

Producer: I think the myth that they were uncommonly savage proves my point about myths being political or used by leaders. History is written by the winners.

Artist: Are we entering the realm of myths as assumptions rather than stories and complex image?

Producer: I think so. But look at our presidents. There are many myths about them and many of the myths are associated with mythic images. Several presidents campaigned as being born in log cabins or born poor. But Lincoln and Lyndon Johnson weren't poor, and Harrison wasn't born in a log cabin. The question is, can an actual, real,human being be a myth? Many would say this is not possible because by definition mythological characters are fabrications in all cultures. Mythological characters are greater than men or women. Sometimes, however, a real persona takes on mythological characteristics because s/he comes to symbolize mythological, larger than life or universal qualities (Biro, 1982).

Artist: But stories and images associated with leaders such as presidents of the United States reflect the journey through life that is the concern of mythology.

Producer: Media figures can become mythical images. They may or may not help to develop global consciousness or understanding. Maybe ritual is no longer the core of mythology. Maybe multi-cultural understanding through media is.

Artist: I don't think so. Mythology has always had several clear functions, and multi-cultural education hasn't been one, although many people such as Joseph Campbell have used mythology for that purpose. Cross-cultural themes in myths identify commonalities but do not necessarily promote understanding of differences.

Producer: What do you think the functions of mythology are?

Artist: First, to give us an outlet for our sense of wonder? This is a mystical function. Next, to represent a culture in terms of ideas in iconic and verbal form. This is a metaphysical or cosmological function.

Producer: I'd add two more functions. There is obviously a sociological function. Myths help maintain the morals and manners of a culture. And there's a pedagogical function. They teach people how to live in harmony through the passages of life from birth to death. This is where the most universal themes are seen in myth.

Artist: I think the primary function of traditional mythology was best described by Goethe. He said that in myth the particular stands for the general revealing momentarily the unknowable. However, over time the educational or teaching value of myth has diminished. Myth makers of today assume that the visual imagery (or stimulus) they present will elicit instant unconsidered response by the reviewers. This means that the viewer must be able to interpret and respond critically based on an understanding of mass media's use of mythological symbols.

Producer: The relationship of myth to the semiotics of images which become cultural symbols is interesting. In his book on *The Semiotic of Myth*, James J. Liszka explains why the study of myths as symbols is important. He says that to the extent that they are believed, myths are dangerous symbols because they form a web that allows control of the culture. To subject myth to criticism is to criticize the culture. To control the myths of a culture is to control the people. To allow criticism is to dilute this power of control. The study of the semiotics of symbols is crucial to preventing control by dogma (Liszka, 1989).

* *

The best defense against control by mythology is an understanding of the semiotics of mythological symbols. If global media experiences in a digital age are likely to lead to a world mythology, visual literacy becomes important in order to prevent manipulation through symbolism. The first step is to understand the nature of visual symbols of mythology by studying them. Then, what is learned will have to be related to educational goals. Scholars would do well to turn to the study of modern mythology and how it is generated instead of pursuing Aphrodite, Athena and Zeus.

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Multimedia and Hypermedia: An Invitation for Discussion

Ora Silverstein

The use of the term "Multimedia" is more and more widespread in various contexts. This creates confusion among non-professionals, namely the general public and also among experts in the field of education and communication. Even experts use phrases such as: "computer-based hypermedia (or multimedia)", "hypertext or hypermedia or multimedia" (Dana, 1990), terms which require definition and clarification. The purpose of this paper is to draw attention and to initiate a discussion and future research in this important subject that will result in better understanding and basic terminology.

The media technologies for communication and information which are used today are numerous and varied. When we say that "we live in the era of multimedia", we are referring to the extensive use of various media in our civilization. Perhaps the most widespread media in our day is the printed media - we all read newspapers, magazines, books and professional printed literature, using diverse and various technologies. Audio media is also widespread. Radio and various vocal instruments are used for communication, using music, sound and words. Advertisements and advertising gimmicks pop-up before our eyes as static visuals or in motion. These are considered visual media, though lately they are supported by an audio dimension as well. Television, video and cinema are audio-visual-motion media, transmitting pictures and voice in sophisticated methods.

The use of many different types of media for creating experiences which combine pleasure and learning, in mass-media and advertising, is becoming more and more popular.

Distance education as through the open university, which uses video and computer software, cable TV,etc., is enormously popular. Computer games, visits to museums, exhibitions and playgrounds, activities which display human knowledge in all possible fields, are attend by individuals, families and large groups. Disneyland and Disneyworld in the United States and Eurodisney near Paris, France, are the most distinct examples of amusement cities where visitors make use of all the communication media existing in the world today. A visit to these places generates pleasure accompanied by learning experiences. The sensual experience at such sites, assisted by the senses of sight, hearing, smelling and touch are brought about by the use of multimedia.

Modern art finds its expression in multimedia (Search, 1993). In most modern art museums we find visuals where a combination of a few elements such as video, a statue and a static picture create a wonderful blend of vision, movement and voice. Last August, the Tel-Aviv Museum of Art exhibited Cindy Sherman, an American living in New York and belonging to a group of artists who have tried to turn photography into the center of artistic discussion. They represent the enormous change which has occurred in contemporary art, expressed in wide use of photographic technologies. This is further supported by another exhibition which took place at the same time in the same museum, called "Paradox of the Material Dream". This exhibition focused on two sites. At one, the "Absolut Vodka" and "Benetton" advertising campaigns were demonstrated for examination of the material dream, while the artistic components are huge pictures synchronically projected by eight monitors. In this case, we cannot talk about multimedia means, since a variety of advanced technologies was used in order to create a visual dynamic show. At the second site, the experience was a result of use of audiovisual multimedia in a most sophisticated way. Visitors watched the visuals through windows located on the four walls of a black cube. In each window a different visual was shown, composed of holograms and various video screenings from four different points. The objective of these visuals was reached through the projection of contrasting messages, such as pictures of violence and prosperity in one of the windows, and complementary messages in another. The intensification of the messages was immense.

Multimedia has been used in education for the last thirty years. I shall mention some examples from the field of natural sciences. The teaching of biology, chemistry and physics has developed in the USA and Great Britain since the fifties, until becoming a unique academic field within itself called Science Education.

In new educational science programs developed in the sixties, such as the BSCS in biology, various combined media were used as an aid in teaching biology subjects, phenomena or processes.

In the sixties, the Tel-Aviv University together with the Israeli Educational Television developed a multimedia system for teaching the "human body". This system dealt with five main subjects: self-identity, movement, breathing, blood and digestion. Each unit includes: a booklet with group activities for students, individual work sheets and a teacher's booklet, all of them containing many pictures and tables. For each unit two black and white TV films were produced, as well as a demo and experiments kit. The term multimedia was used for the project from the very beginning of its development.

A few years later, color TV became available in Israel and Israeli Educational TV began broadcasting science films produced in Great Britain, in color, on the human body, as part of the multimedia program*. Hebrew subtitles were added at first, and only later a Hebrew voiceover. As a result, a dynamic process took place over a five year period in which broadcasts in black and white as well as color concerning the human body could be seen on television, part of them in English and others in Hebrew. Today, some of the scientific movies shown on educational TV in Israel are in English with Hebrew and Arabic subtitles.

The "Life" Story animation series, dealing with the human body, produced in France, has also been broadcasted in Israel for the last five years, in Hebrew.This series substantially differs from the documentary broadcasts concerned with the human body (Silverstein, Tamir, 1991). For teaching the human body and also in all other cases, biology teachers in Israel use TV, as well as video programs in addition to the traditional teaching tools. They also use the press, illustrated work sheets, experiments and observations. Today's learning resources for the subject the human body allow for major diversity. The French "Prosidis" company, who produced the series "Life", also produced illustrated booklets accompanying each TV episode,including stickers and a plastic puzzle regarding the organ discussed in that particular episode. The British Phillip Harris company has recently prepared a data base of the human body on a compact disk and supplementary models and sensors connected to computer software. All these add more possibilities for new experiences.

In South Africa, a new science multimedia program, "Spiders Place", is being developed using the radio, dolls of the size of children, video films, comics magazines and a variety of other activities. This method is meant to meet the needs of a poor, urban population, to whom exact and natural sciences seem such a strange field, that children and adults as one, feel threatened by it. Multimedia instruments are used in order to get students acquainted with educational messages, in a way both pleasant and full of new enthusiasting experiences.

Since teaching of sciences is a field in which illustration helps learning, the use of multimedia is widespread also in fields where kits as those described above do not exist. In Israel, a science teacher would normally use the following aids in class: student's book, teacher's book, laboratory sessions, observations, video films, computer aids, newspaper articles and information centers, as mentioned above. This is the description of a multimedia system. Professional training provided by regional information centers assist teachers in their science teaching activity.

Personal computers were introduced for widespread use in 1981, and recently, the average personal computer's ability is getting close to containing the volume of data required for computer-multimedia. This is a new technology incorporated in all computers of the major companies: Apple's Mackintosh, Commodore's Amiga, IBM computers and IBM compatible PCs. This technology enables the use of various media in order to create new products and display them on a computer monitor: visual text, voice, picture-drawing, animation, and video of analog origin - on tape or disk, or of digital origin, hardware or software supported (Lockard, 1990). The computer, being a digital system, can presently display pictures of analog origin, but cannot process them. The need for a huge memory for the processing of pictures and voice, still forms a serious developmental problem in this field (Renzer, 1992).

Computer-multimedia is presently used for learning (Peterson, 1993). It enables students to listen to music while explanations, illustrations and notes are displayed, and games and information are supplied in an interesting way. Multimedia electronic libraries are being developed and available in various technologies, and are beginning to be used in all academic fields. This is a technology in course of creation. It is used in many other sectors as well, such as industry, business, army, education and consumption of culture. Hi-Tech companies offer operating systems, software and hardware instruments, develop various sections specializing in production of educational programs and data bases; in addition, advertising companies, video and TV also make use of this new technology (Lockard, 1990).

The enlightened citizen is beginning to use computer-multimedia products. People who create in various fields already use this new instrument, and it is expected to become more widespread in the future.

Today educational programs displaying various subjects through computer-multimedia are available (Botto, 1992). Many children around the world use these computer-multimedia programs within the framework of nursery-schools or at home, in order to learn how to read. Since the beginning of 1993, more than half of the nursery-schools in Israel have computers.

Furthermore, you can purchase software programs and produce your own computer-multimedia in home and institutional environments. Computer and hi-tech companies are the reason for this advancement. High priority is given to the development of hardware and software computer-multimedia in a world which is becoming saturated with computers for purposes of office organization and accumulation of information.

This is a new turning point because of the possibilities available for using visual, audio and printed data bases in numerous combinations and three dimension graphics interacting in one PC system.

Today, the term "multimedia" is being used for computer-multimedia technology as well, without clear distinction. The term "hypermedia" is justly used for describing other special computer abilities.

It seems that the phenomenon of multimedia as described above, meaning many different media, is not academically discussed. Computer-multimedia is not only "another technology". It is going to play an important role in the 21st century. Computer-multimedia is added to the many other media interacting with human perception. It is very important to open a discussion and define new terms so as to avoid confusion. This will enable educators, hi-tech and communication media professionals and the general public as well, to attain a more accurate understanding of the multimedia phenomenon occurring today.

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Visual Thinking Skills for the Digital Age

Dennis M. Dake

The central premise of this paper is that there is a group of visual thinking skills which are becoming increasingly foundational and basic to the education of a contemporary citizenry. These skills are becoming more vital as the use of digital imagery increases. The skills are, however, independent of the external technologies (hardware and software) that amplify their necessity; they are internal technologies of the human mind.

Moving from Analog (continuous) to Digital (discrete) imagery has many advantages for promoting sound visual thinking and graphic ideation. These advantages include:

- Empowering individuals with visual language skills
- Promoting interaction with visual imagery
- Increasing storage and retrieval of imagery
- Encouraging flexibility in visual thought
- Developing deeper meaning in visual messages
- Reusing existing visual imagery for communication.

Recent publications and lectures are full of praise for the technological marvels of the new digital technologies which will become increasingly available to the general populace. However, these strengths of the digital media may turn out to be an educational and cultural blessing or an equally great curse, depending upon how they are developed and utilized.

Technology does not always live up to its promise; just because a capability exists does not mean it will be effectively utilized. For example, when television was first introduced as a mass media, it was touted as revolutionary educational tool for mass education. That commercial television is now widely regarded as a "vast cultural wasteland" demonstrates how new media can fail to live up to their advertised potential. The fault lies not in the technology but rather in how we humans choose to use these new tools that modern technology provides.

Digital storage, manipulation and retrieval, with their pervasive speed do not create these problems but only accelerate and amplify the necessity for developing the necessary"internal technologies" of the human mind as basic education. Humans must not, as Henry David

Thoreau once said, " become tools of their tools." Now is the time for humans to develop the thinking skills needed for control of the new digital tools.

These visual thinking skills, needed to understand and effectively use the full potential of digital imagery, are not technology specific. They can be taught with any media, since they reside in the human mind. The remainder of this paper will explore how each of the visual thinking skills, necessary to maximize the use of the digital media, can be learned with traditional art activities.

Puts Power of Visual Language in Individual's Hands

Powerful visual language tools will be much more accessible in future, and an educated public will need to have the skills to use them well. But literacy in language requires more than mere utterance. As the artist Paul Klee wrote in his journal, it is necessary in order to create effective form that one must concentrate on the lively process of formation. *"Form must on no account ever be considered as something to be got over with, as a result, as an end, but rather as genesis, growth, essence. Form as semblance is an evil and dangerous specter. What is good is form as movement, as action, as active form. What is bad is form as immobility, as an end, as something that has been tolerated and got rid of. What is good is form-giving. What is bad is form. Form is the end, death. Form-giving is movement, action. Form giving is life."* (Spiller, 1961)

Close examination of the visual record in art history shows clearly that visual ideas evolve, have precedents in the prior work of an artist, and slowly metamorphose into their final forms. This evolutionary change is conducted by disciplined visual thinking from visual configuration to visual configuration, over time. While the manipulability of the digital medium could be a great assistance in supporting this lengthy visual thinking, the educational focus must be on the process and not on the finished, developed form (digital image) at the end of the process.

As shown in the figures 1-5, from a college student of visual thinking, the process of generating original visual imagery is time consuming, hard work. This process does, however, build an honest and lasting sense of individual control over the ideation process rather than an illusion of control easily imparted by the quickness and slickness of digital manipulation. This digital illusion of control may lead image makers into the all too simple solutions when these are truly only initial starting points of the longer formation process.

The long evolutionary process of search and discovery for visual form can certainly be made more convenient and accessible when conducted in a digital environment. Because one can take fragments and elements of the visual world and recombine them at will, digital technology can also artificially heighten the sense of instantaneous illumination. But the danger is that the speed with which digital machinery responds will provide an illusion of success and control at the expense of the true disciplined work necessary for developing ideas. The best visual idea can not be known in advance by purely mental manipulation. It can only be discovered from a quantity of possible outcomes. What is convenient and accessible may not be true to perception and personality. Life takes time to

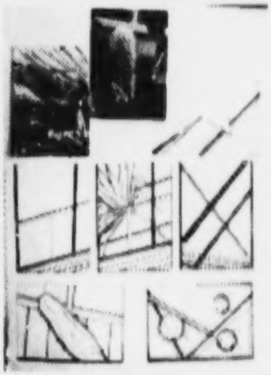


Figure 1: Visual configurations can be found anywhere.

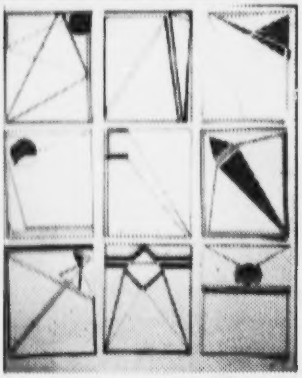


Figure 2: Thoughtful variations

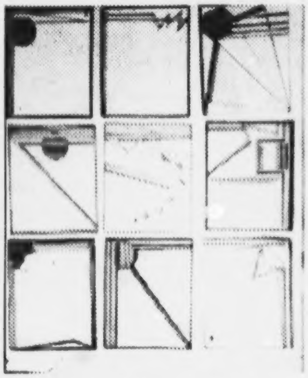


Figure 3: More variations

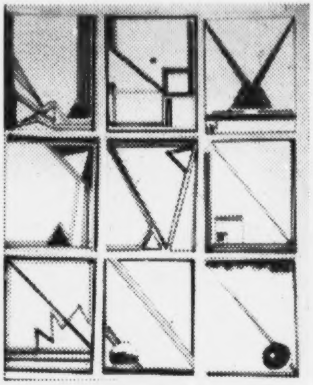


Figure 4: Visual ideas evolve over time.

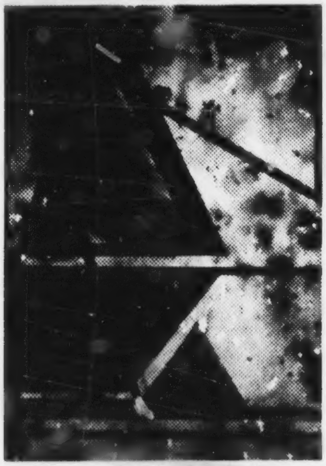


Figure 5: Final Painting

Figures 1 - 5: Copyright Paula Schaffer Bolander, Used with permission of artist

unfold.

Greater Flexibility and Manipulability

As William J. Mitchell, author of the recent book, The Reconfigured Eye observed, "*Digital imagers give meaning and value to computational ready-mades by appropriation, transformation, reprocessing, and recombination; we have entered the age of electrobricollage.*" (Mitchell, 1992). Because digital images are so manipulable, they challenge our traditional sense of visual reality. Digital images are stored as discrete bits of information which are context-free and available for either flexible manipulation, cloning, or combining images into new contextual relationships. This technologically assisted alteration is imperceptible to the unaided human eye. Electronic digital imaging has therefore made visual literacy more problematic.

The digital potential for image modification presents a great temptation to "improve" images, (i.e.. alter in ways not present in external reality). This same human motivation for producing images that captivate attention and compel effective communication has always been present for visual designers in older

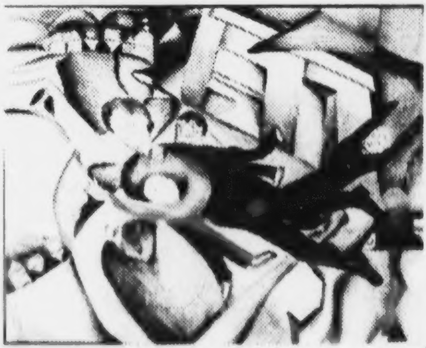


Figure 6: Beginning, illustration of the idea

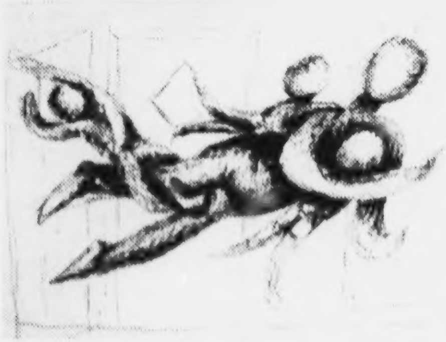


Figure 7: Variation on the theme

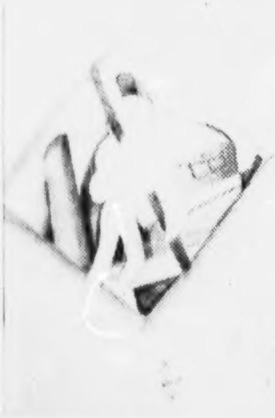


Figure 8: Evolution into a verticle format

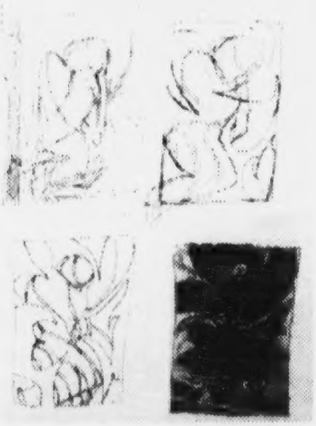


Figure 9a: Shaping into a statement in form

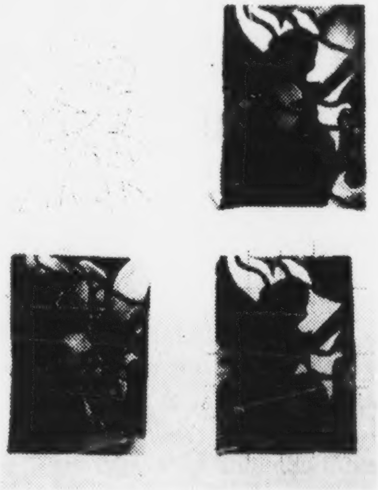


Figure 9b: Visual Logic develops

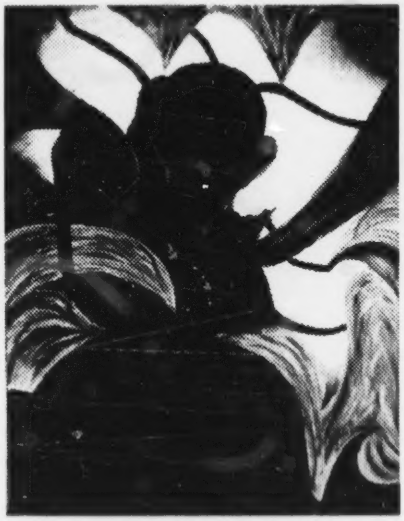


Figure 10: Final Painting

Figures 6 - 10: Copyright Deena Elm, Used with permission of artist media. Digital imagery just gives much more convincing and therefore potentially deceptive means for this image manipulation. The issues concerning the nature of visual truth and meaning involved in image manipulation are confronted every day by artists as an inherent part of their professional responsibilities. What do all the variations mean?

Figures 6 - 10, show the manipulation of an image on the theme of parental responsibility and child dependency. At first the image (figure 6) is representational and dream like. As the artist continued to refine the visual message, she changed it a great deal, thereby increasing its visual impact and meaning. The tensions, use of depth clues, and unity of the piece were increased in the act of thinking and rethinking its visual structure. The meaning was deepened by visually stressing in form only, an organic bonding of parent and child mixed in equal measure with the tied up feeling of overwhelming responsibilities. The final synthesis, shown in figure 10, is an eloquent form statement, still intuitively connected to the initial inspiration. Images can evolve into new forms which have greater cohesiveness, comprehensibility and congruity: a visual logic. Digital imagery and traditional art making are placed on the same footing in developing visual logic.

Since the photographic medium can no longer be trusted in a literal way, the credibility of the visual message designer becomes central. A developed sense of visual logic is a vital thinking skill for critically assessing the trustworthiness of these creators within the digitally mediated visual environment.

Increases the Interactive Dialog with the Image

With graphic ideation in any media, digital or otherwise, a difficulty arises in being both the observer and the active creator of the thing observed. In the digital age the artist or designer no longer has the advantage of an ego-driven, stable, and unchanging (objective) platform from which to make his/her design decisions. The objective position, in the western European visual tradition, is represented by static Renaissance perspective. With digital imagery, what one does visually is immediately changeable

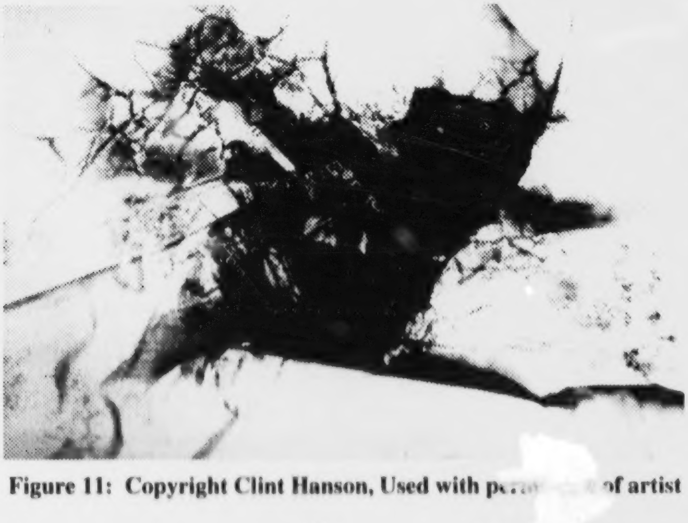


Figure 11: Copyright Clint Hanson, Used with pe[illegible] of artist

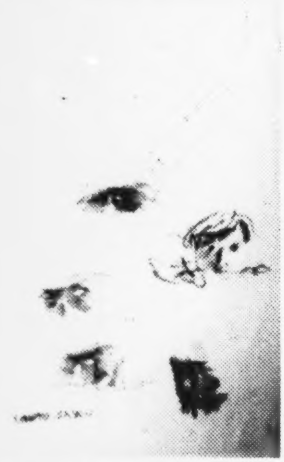


Figure 12: Finding a personal connection

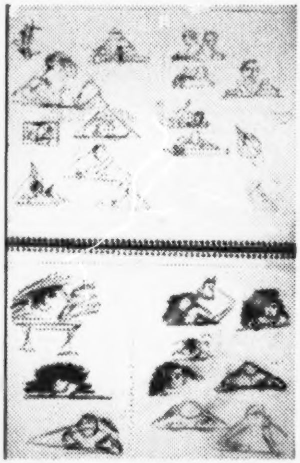


Figure 13: Exploring Possibilities

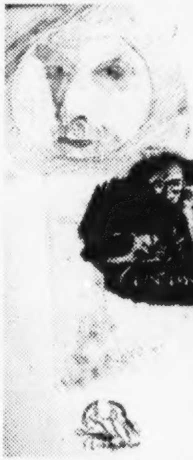


Figure 14: Developing into a self portrait

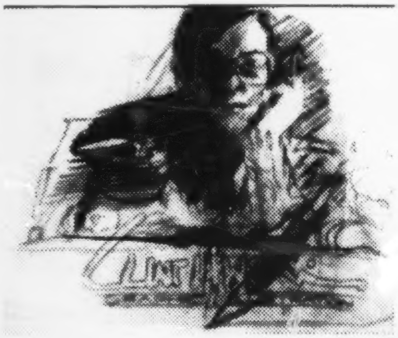
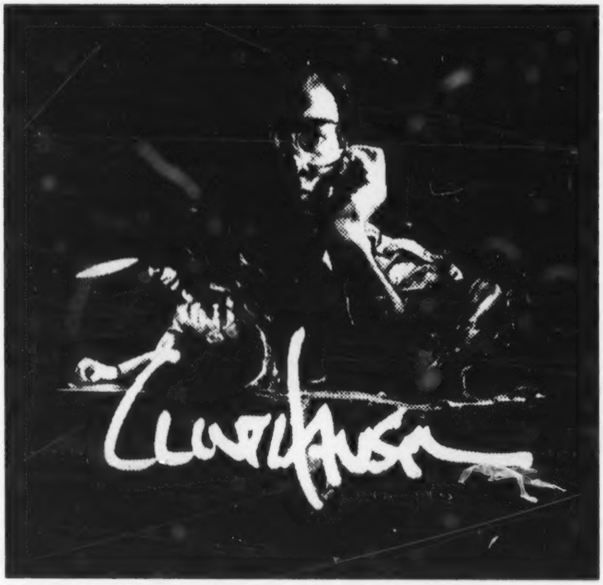


Figure 15: Image comes together with metaphoric idea of exacto blade plunging "erotically" below the surface appearance.

Figure 16: Final Scratchboard - frontpiece for illustrator's portfolio



Figures 12 - 16: Copyright Clint Hansen, Used with permission of artist and perceivable on the monitor. The self is totally immersed in this process and can not extract itself to some privileged static and stationary position from which to objectively view the message as it develops. As with the Heisenberg Uncertainty Principle in physics, the individual is an interlocking and inseparable part of the observed.

Even in the most ambiguous of visual environments, such as a crumpled sheet of white paper, shown in figure 11, personal meaning can be perceived. In this case the student of visual thinking has found a strange and mysterious face staring back at him while he develops the shapes on the crumpled sheet. This face can be seen turning into a meaningful self portrait in the subsequent visual thinking studies, shown in figures 12 -16.

What is perceived when working in a digital media can once again be instantly acted upon. This forces a multitude of decisions upon the designer, decisions made so quickly that he/she is denied the slow growth of vision and reflectivity afforded by older non-digital media. Quick decision making and reaction require a more fluid and open mental framework and the greater complexity of this interactive dialog requires a greater reliance on intuition as a thinking skill. Only by participating deeply in an interactive process and accepting it completely can the designer create new combinations of existing ideas with a deeper series of meanings.

How much meaningful experience will future students get interacting with the new digital media (as opposed to simply being passive consumers) when our school systems do not yet place a high priority on developing intuition? Quality visual education will be needed to develop the intuitive thinking skills necessary to handle this aspect of the new digital environment. Every individual must be intimately involved.

Storage and Retrieval Greatly Expanded

Digital storage and retrieval of information is instantaneous. Unlimited exact copies of information can be quickly made in any number and reliably stored. Access to past images can be quick and sure. But this storehouse of information is accessible only if the individual can remember that the images exist and know where to find them. Greater storage and retrieval are of great advantage to the visual image maker because they give greater access to past ideas and therefore to potential new directions for thought. If the visual message designer can access and have use of much more material, new thoughts will be richer.

The problem is that not all that can be saved as visual data is worthwhile. More visual ideas are available for use from digital image data banks than are necessary for the process of visual thinking. This brings up an issue of human meaning and utility. Even if we believe we see what might be useful as an image, it is by no means certain that we will have the necessary thinking skills to use it effectively. Perhaps, the older, more time consuming artistic practices of recopying and redoing images, by hand, serve an important human function. Visual thinking by drawing allows for the time and reflection necessary to discover the deepest, meaningful associations possible with the material.

Traditional image generation places a

premium on using original sources provided by a heightened visual memory. For example, figures 17 - 19 are sketches leading to the development of a large, expressive ceramic container (Figure 20). The finished container was based upon the discovery of important personal memories of a youthful fascination with horses and psychological associations with a long forgotten horse blanket. Multiple thinking sketches helped the artist to understand and visually synthesize this meaning in an intuited form. This process is time consuming and emotionally difficult work. It is, however, absolutely necessary if the final form is to convey a strong sense of personal conviction.

In many ways the seductive traits of digital imagery, without disciplined visual thought, can lead the person away from

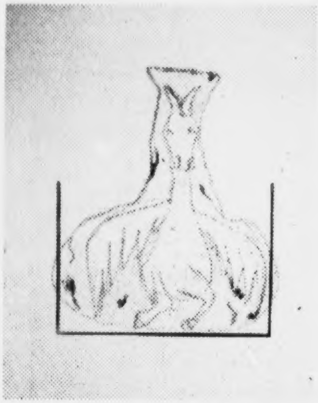


Figure 17: Horse as idea source

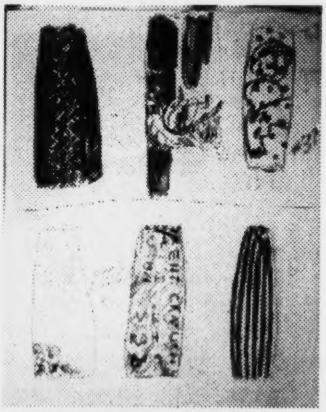


Figure 18: Possibilities

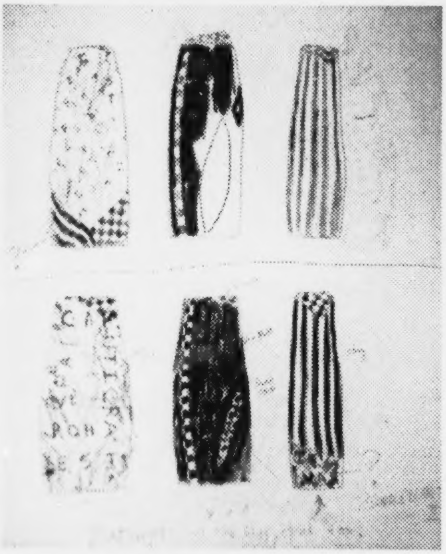


Figure 19: Disciplined search for form that fits the individual's experience

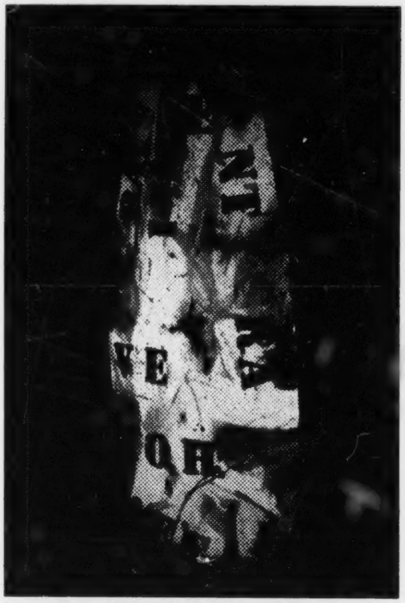


Figure 20: Ceramic container

Figures 17 - 20: Copyright Karen Terpstra, Used with permissionof the artist

meaningful imagery. Psychologist Rudolf Arnheim pointed out this danger in reference to media based curriculums of an earlier era. *"By now, we start in kindergarten to overwhelm children with an endless variety of materials and tricks, which keep them distracted - distracted from the only task that counts, namely, the slow and patient and disciplined search for the one and only form that fits the underlying experience."* (Arnheim, 1972, p13)

The tricks of digital imagery must not be allowed to distract the next generation of students from the all important task of form refinement. Educationally it does not matter if the form turns out to be a work of art, science, or technology.

Multilevel Meaning rather than Linear, Singular Meaning

The ability to generate multiple versions of visual forms and then refine them for a sense of visual logic leads to another problematic area: the nature of visual meaning and truth itself. When a digitally altered (that is to say undetectable, modified, photographic-like image) enters the external world of visual communications it still conveys a convincing sense of real context to the viewer. When viewed against the conventional societal standard of singular meaning (which holds that this image must either be a true representation of the world as it exists or else it is false, misleading, or worse) the digital image poses new problems of interpretation. This new and confusing state of affairs leads a sensitive viewer to questions such as, "Is this visual evidence I can depend upon or is it sly propaganda and manipulation?" A loose standard of truth, such as that favored by the supermarket tabloids, is not sufficient for any critically thinking, visually literate person.

The long held western European cultural illusion of a single, visually knowable, objective truth is in for some serious revision. In a digitally controlled "virtual reality," each manipulation and modification of visual form leads to alternative implications and interpretations. Where do ultimate meaning and truth reside?

The reality seems to be that truth and meaning reside equally in the minds of both the person making and the person viewing the form. Visual reality, in the digital age, is clearly revealed as an individual's own construction, based on past experiences, expectations and assumptions. The ability to digitally alter visual imagery, at will, is leading to a blurring of the boundaries between metaphoric art with its multiple interpretations, supposedly objective science, and everyday life itself. Like works of art, digital images are endlessly self-referential symbolic constructions.

The visual arts have always been considered subjective; that is to say, individual and unreliable as a source of literally accurate information. Visual reality is revealed in a digital environment to be a much more malleable construct than a visually illiterate public seems yet to realize.

The art student who produced the image (figure 24), of an astronaut floating on an unusual tether had to deal with this slippery nature of visual reality. Her first visual thinking efforts (figure 21) were directed at the discovery of personal meaning only. In a series of drawings of floating ribbon-like structures in which appeared a human face, she found a compelling theme of unknown meaning.

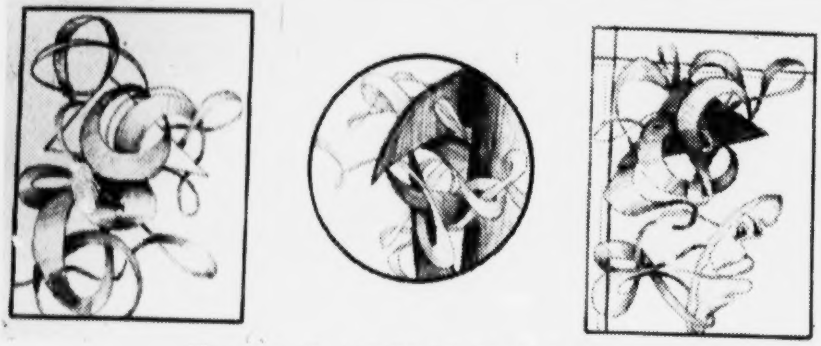


Figure 21: Early "ribbon" drawings

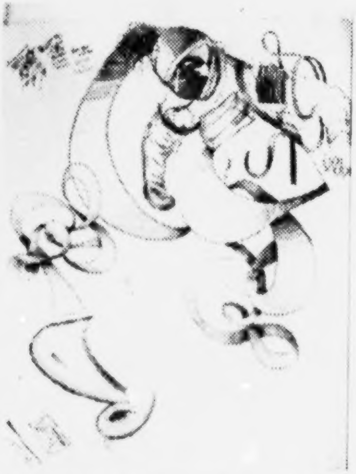


Figure 23: Astronaut on tether

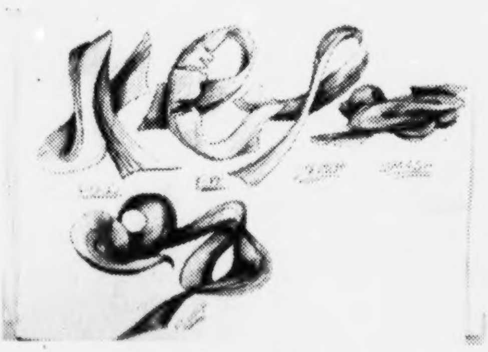


Figure 22: Possibilities

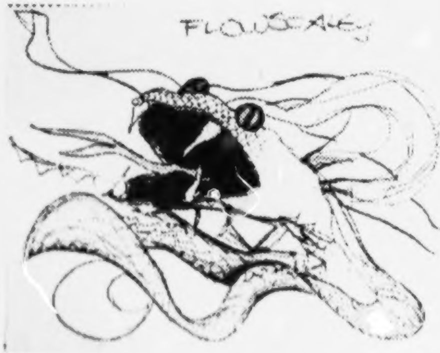


Figure 24: Vision from a dream

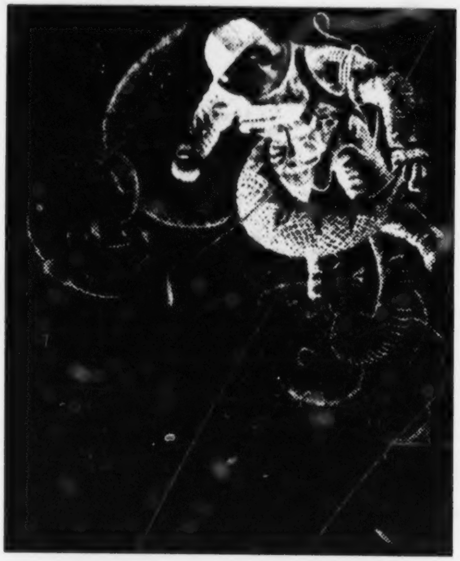


Figure 25: Final scratchboard drawing

Figures 21 - 25: Copyright Carol Roan Hafkemeyer, Used with permission of artist

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This was followed, some time later, with an interest in drawing from a photograph of an astronaut on a spacewalk, tethered by support lines to his space ship. In her thinking, these two frames of experience (astronaut and ribbons) were separate for a long time. Then one evening a particularly vivid dream of a "flow-scaly" snake (figure 23) provided her with a visual suggestion of the necessary synthesis of form and meaning. This creative insight became the basis for her final scratch board drawing (shown in figure 24).

This discovery of meaning and associated form could not be made by purely conscious verbal reasoning alone. It required sustained visual thought and reflection. In this act of visual creation and discovery, multiple levels of meaning have also been discovered. On the literal level, the image is still recognizable as an astronaut tied by umbilical cord and oxygen hose to his mother ship. On a personal level the artist revealed that she was herself, as a college student, still tied by a psychological umbilical cord and finances to her mother. The truth of the complete dependence of every fetus on its mother through an umbilical cord is also implied in this image. On a psychological level, every individual remains tethered to the experiences and ideas of their individual past. A healthy maturation requires a recognition of this reality. Finally, it might be noted, theories concerning the evolution of the human species suggest an aquatic, reptilian origin for the oldest evolutionary portions of the brain. In the triune brain, the brain stem serves as a tether to the body. All of these multiple levels of meaning have to be simultaneously explored and molded by the visual designer into one visual creation.

Digital imagery requires of its viewers and creators alike the ability to accept and attempt to understand multiple, simultaneous levels of meaning as a basic educational reality. Digital technology has put "the process of shifting confusions of art and artifice, reality and illusion, into our own hands." (Brand, et. al., 1985). We need an alternative paradigm in our culture for understanding that meaning and truth are dependent upon the conceptual and perceptual framework of each viewer.

Use and Reuse of Existing Images from the Global Village

Because digital images are so easy to store and retrieve, vast image data banks are being created with imagery from throughout the world. This multiculturally rich body of work can be used in an unlimited variety of ways. This becomes a problem when an important image from one cultural context is misapplied to other ends. Intention and appropriate usage are issues that raise strong emotional reactions in the people who create and hold images as central to their culture. We may, as Marshall McLuhan observed, "now live in a global village...a simultaneous happening." (McLuhan, 1967), but all is not well in that village when an important image is misappropriated. Ethical problems can also arise from the reuse of existing images in one's own culture when that image is under copyright. Digital imagery, by breaking the evidentiary bonds with the original source, makes misappropriation and misuse of important images ever more likely.

All traditional artists have had to deal with the existence of precedent images as an integral part of their work. Art history provides only a limited range of themes,

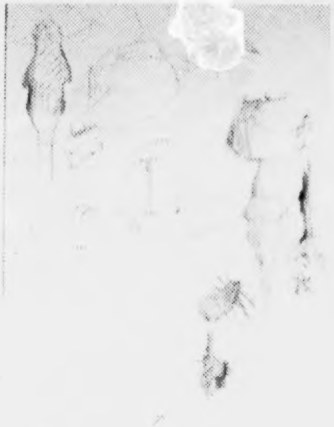

Figure 26: Last memories

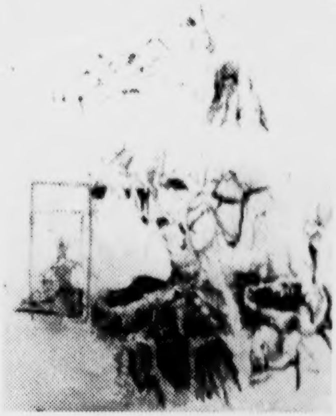

Figure 27: "Aging" nature

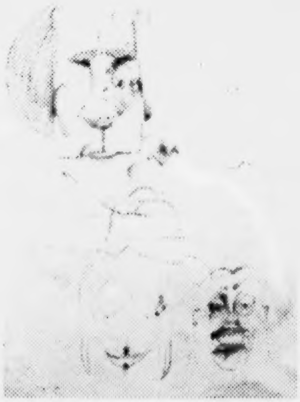

Figure 28: Multicultural sources

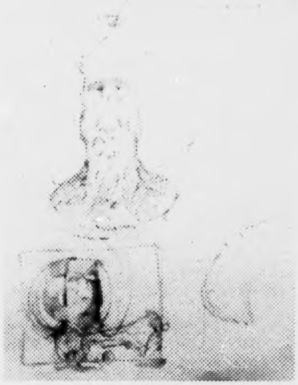

Figure 29: Personal images

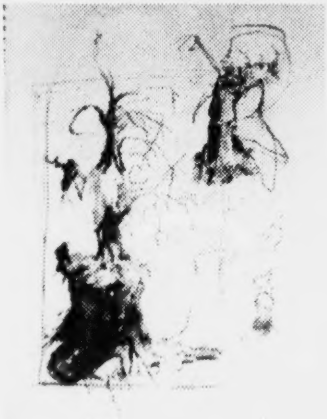

Figure 30: Visual ideas come together

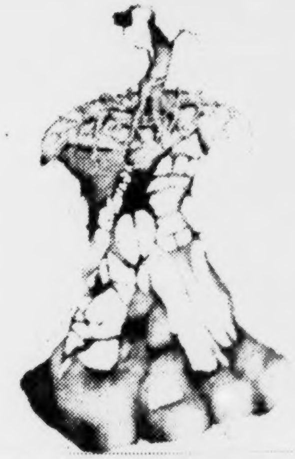

Figure 31: Final Drawing

Figures 26 - 31: Copyright Michael Lyons, Used with permission of artist styles, and sources. Where is the artist to draw the thin line between appropriate eclectic usage and dishonest copying of prior images? This ethical issue requires a crucial ethical, decision making process. In an age of ever-shifting visual relationships, there is a deep educational need for learning how to handle a post modern contextual dialog.

Figures 26 through 31 illustrate an art student's visual quest for an image to evoke the memory of his deceased grandmother. Visual reminders of this grandmother's reclusive environment (figure 26) mix freely with images from nature (figure 27). Larger contextual issues are indicated by multicultural images (figure 28) and forms (such as an apple core) from the artist's environment (figure 29). These he has blended into a unique and original symbol (figure 31). Is the originality (honest expression of one's origins) as shown in this example, a dependable source of meaning for the viewer? To answer this question our education system needs to promote divergent as well as convergent thinking.

Conclusion

The sheer volume and speed of digital imagery threatens to overwhelm the thinking ability of humans. There are vital visual literacy education issues which need to be addressed, such as: accurate vision, imaginative vision, truthful vision, metaphoric vision, and logical vision. William Mitchell in his book, "The Reconfigured Eye" summarized these implications of digital imagery in the following manner. *"The growing circulation of the new graphic currency that digital imaging technology mints is relentlessly destabilizing the old photographic orthodoxy, denaturing the established rules of graphic communication, and disrupting the familiar practices of image production and exchange. This condition demands, with increasing urgency, a fundamental critical reappraisal of the issues to which we put graphic artifacts, the values we therefore assign to them, and the ethical principles that guide our transactions with them."* (Mitchell, 1992, p 223) We are a long way from developing, understanding, and implementing an educational agenda for the digital age.

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Exploring the Hyper-Environment for Elementary Children

Beth A. Wiegmann

The hyper-environment is changing the way we access information via technology. It allows information access along nonlinear pathways (Horn, 1989, Locatis, Letourneau, & Banvard, 1989). This format permits the learner to access information (text or visual) using the conceptual framework that the learner brings to the task. By constructing knowledge based on learner connections the knowledge gained is more meaningful.

Those providing computer-based instruction need to be aware of the various forms of hypermedia instruction (Jonassen & Grabinger, 1990). Educators working with elementary children need to consider the impact of unstructured hypermedia and structured hypermedia on the learning taking place during computer-assisted instruction. It is very easy for learners to become disoriented within the hyper-environment unless their ability to focus on context is very strong (Jih & Reeves, 1992).

This paper will discuss a case study of one collaborative group of four boys during a summer science and technology camp. Their interactions and reactions with two different examples of computer-based hypermedia will be discussed.

SCI-TECH Camp

For the past two summers Northern Illinois University has entered into cosponsorship with Encyclopaedia Britannica Educational Corporation to present a hands-on science camp to elementary school children entitled SCI-TECH Camp. During the summer of 1992 the camp was a beta-pilot of the newly created Britannica Science System (BSS). BSS was a combination of two separate science programs. The first was Full Option Science System (FOSS), a hands-on approach to teaching science developed at the Lawrence Hall of Science through an NSF grant. The second was Britannica's Science Essentials, originally a videotape series (now on videodisc) of information and hands-on science activities for elementary children.

The half-day camp was designed to provide elementary children (grades 3-4 am and grades 5-6 pm) with opportunities to explore science content via hands-on investigations and multimedia materials. The children explored topics including electricity and magnetism, human body, levers and pulleys, and solar energy. Daily each child had the opportunity to select one of the topics for the day's investigation.

During the 1992 camp we observed that the children would utilize the computer-based hypermedia as a discrete form of instruction regardless of the setting surrounding the use of the computer. The children were not likely to begin a hands-on investigation and then refer to related material on the hypermedia until they had completed the investigation. Nor did the children observe a hands-on investigation on the videodisc and then ask to actually perform the investigation, even though the materials were readily available.

As we reflected on the 1992 camp several questions emerged regarding the children's use of hypermedia. How do children use the hyper-environment for instruction? Is their learning effective? Do they possess the cognitive skills necessary to create meaning? Who is the mediated instruction for? Is it for the children who are to learn from it or the adults who purchase it? Based on the casual observations of the 1992 camp we planned to observe the student's use of hypermedia more closely during the summer camp of 1993.

The Computer-Based Hypermedia Programs

The camp staff was charged with developing a camp curriculum that would allow children to explore science using hands-on elements combined with hypermedia. To respond to that requirement a rapid prototype for a computer-based hypermedia environment was developed that was responsive to the need to provide learner guidance yet allow for exploration. This prototype was developed independent of the materials supplied with Science Essentials. Due to the limited lead-time for developing the camp curriculum the prototype was abandoned for the 1992 camp. However, the skeletal framework was in place prior to viewing the Science Essentials hypermedia material.

During the fall of 1992 and the spring of 1993 the investigation-based prototype was developed. This format used a structured hypermedia approach to provide children with a framework for exploring the videodisc information while exploring a hands-on activity. The program, hereafter referred to as Program A, was developed using LinkWay. Early screens provided information to the learner about identifying the proper videodisc, how to use the cursor to guide the computer, and how to initialize the videodisc player as shown in figure 1.

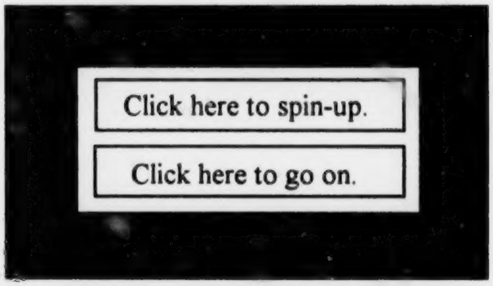
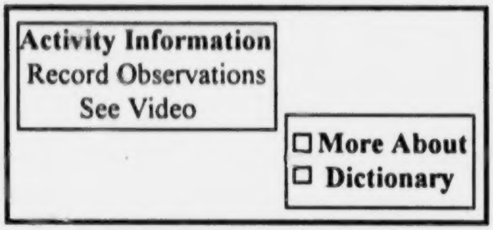


Figure 1. Initializing Player

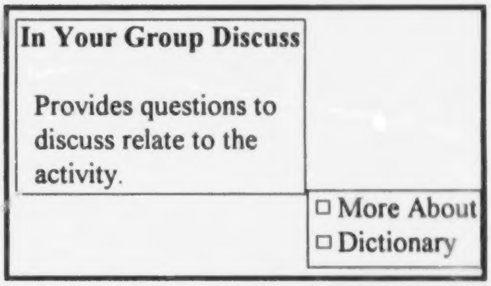
Once the activity was accessed the learner or collaborative group was guided through the activity. The instructions told the learner what equipment was needed for the activity along with the required *Think Sheet*. This information could be accessed visually by clicking on the *See Video* icon as shown in figure 2.



Also included navigation and help.

Figure 2. Activity Instructions

The learner(s) were guided through the activity by combining visual and text information. Discussion points were built into the program to encourage discussion among the learners as shown in figure 3.



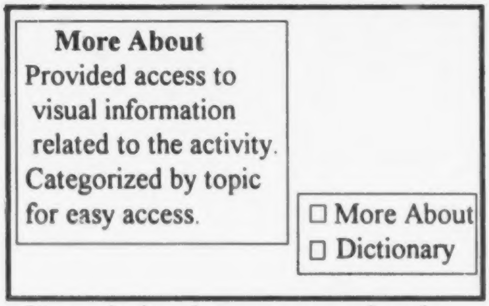
In Your Group Discuss

Provides questions to discuss relate to the activity.

Also included navigation and help.

Figure 3. Discussion Points

At any point throughout the activity the learner could access a section entitled *More About* as shown in figure 4.



More About

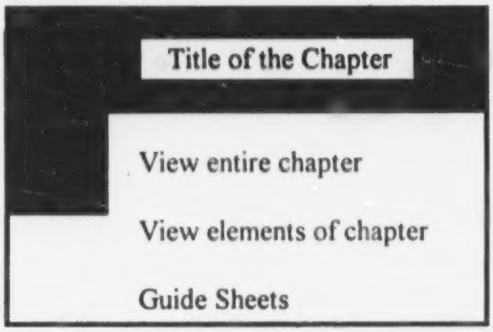
Provided access to visual information related to the activity. Categorized by topic for easy access.

Upon closing the user returned to the spot in the activity they left.

Figure 4. More About

This section provided a visual database of information contained in the videodisc related to the activity topic. In addition a dictionary was available from any activity screen. The dictionary contained definitions of key words related to the activity as well as a visual explanation of the word or word group. Each screen provided navigational and help information as well.

The second program, hereafter referred to as Program B, was developed on HyperCard. The early screens provided directories for multiple ways to access the disc information including: by title, by scientific theme, and by index. There was a single screen related to each specific activity or topic (as shown in figure 5), providing an unstructured hypermedia environment.



Also included: navigational information, glossary, help, access to a notebook, play video & make video clip commands.

Figure 5. Single Screen Format

Each videodisc contained four chapters so there were four discrete screens per disc. Each discrete screen provided video access so the learner could see the entire chapter including the lesson, or view informative segments (similar to the *More About* in Program A), or view the *Think Sheets* for the activity. In addition, Program B featured an option to access an online notebook and provided the opportunity to create barcodes of specified videoclips. The glossary contained definitions of key words related to the activity chapter including an audio pronunciation of the word. Each screen provided navigational and help information as well.

Camp Setting

The camp took place in the Science Education Center at Northern Illinois University. This facility housed the elementary science education materials for the university. In addition, instructional and reference materials, science equipment and supplies were located in this facility. A portion of the facility also served as the classroom area for science education instruction.

The classroom was large and invited investigation. Each of the six tables in the classroom was surrounded by six chairs. The worktables were large enough to allow for individual work areas yet small enough to allow group work that encouraged collaboration. The classroom also had spacious ledges surrounding the instruction area and five large sinks were available in the room. The work area was well lit by natural and artificial light sources. Plants hung in the windows and there were several animals that were residents in the facility.

Several College of Education departments teamed together to provide sufficient equipment for the camp participants. During the camp of 1993 there were two DOS platforms complete with videodisc players connected. One of the DOS platforms also supported a CD-ROM with Compton's Multimedia Encyclopedia. In addition, two MAC platforms complete with videodisc players were also available. A third DOS platform was available to the camp staff, but was not used. There was also a videodisc player with a monitor in the room. This station was used by the children via a barcode reader.

The campers attended in the morning (grades 3-4) or in the afternoon (grades 5-6). Upon their arrival the campers worked on a large group hands-on science project that was designed to last over the entire week. This was a common topic to all participants. After about one hour the campers began to work on their specific projects. The afternoon campers were able to choose between two topics: Landforms and Levers and Pulleys. The levers and pulleys campers were the children observed for this study. The specific projects focused on a problem requiring a solution proposal by the end of the week of camp. These problems were carefully designed to combine hands-on investigations with multimedia materials.

Observations of the Campers

The enrollment for SCI-TECH Camp's afternoon session was very small in 1993. A total of 8 children attended, seven male and one female. The collaborative group (N=4) that was observed were all male and had completed the fifth grade. Their topic of study was levers and pulleys.

On Wednesday the children were provided the opportunity to work with Program B. On Thursday the children worked with Program A. Both programs were based on the videodisc entitled *Simple Machines and Motion* from BSS. Each day they were instructed how to work with the computer-based hypermedia program and were then left alone to work. That is, they controlled the decision-making process, asked the questions, and determined the course of the multimedia use. A camp staff member remained with them to assist them if necessary.

On Wednesday when the children used Program B they used the hyper-environment strictly to view the visual material. When they were done viewing they did not pursue the activity ideas further. When they had viewed the entire chapter and the elements of the chapter they were done. If they viewed material that they had already seen several stated, "We've seen that already," and went on to another element of the chapter. They collaborated on accessing the information.

On Thursday when the children used Program A their work was more integrated. Since the program centered around a specific activity they seemed to work through the steps of the activity, following the direction of the program. While they could have gone on through the program without performing the steps in the activity they did not. When they got to the first screen that directed them to perform the first step of the activity they sat there several seconds then one of them said, "Oh," and went over to the table and began to set-up the investigation. The others followed and watched. After the second screen which gave more information about the activity the others joined in the investigation. They did not explore the database of information until they had completed all the steps to the activity.

Discussion

The children we observed did use the hyper-environments in two different ways. In Program B which tended toward a more typical hyper-environment the children were satisfied to rely on visuals to gain information. As one participant said, "I'd rather just watch the disc. Well, the activities were interesting to try, but I liked to sit lazily watching the disc. It was more entertaining..." Another said, "I'd rather use the computer. Using computers gets my full attention, just because it keeps my attention." One student stated, "I wanted to do the activity I saw, but I didn't think about doing it when we were done [viewing the computer material]."

When they used Program A the children worked through the activity following the steps provided in the program. They combined the hands-on with the visual information. Upon completion of the activity they used the resource materials to supplement what they had done. As one participant said, "It was more helpful to use the computer and then the hands-on." Another stated, "I'd rather the computer told me what to do then go back and do a little more [of the activity], but not isolated doing one thing or another, but doing both." One child summed up his attitude toward using computers by stating, "Yes, it was helpful to have the computer give directions. I like to be told by a person, but the computer is just fine with me."

Our case study points to the importance of examining the use of the hyper-environment with elementary age children. Based on our observations if teachers want to use the hyper-environment as a way to explore hands-on investigations using the computer as a resource then it appeared that Program A was more successful in integrating the two. Further work in this area needs to be encouraged.

We identified many unanswered questions during our observations. Some of them follow. Do developers of multimedia need to consider the developmental level of the learner when creating hypermedia software for elementary children? Do teachers have enough expertise in media evaluation to make good selections regarding the materials they purchase? Is hypermedia purchased, for the type of learning that is expected to occur? How can effective hypermedia instruction be created for the early elementary learner? What learner control elements must be present to help early elementary learners learn effectively from a hyper-environment?

Regardless of the questions raised, either platform provided the campers with a rich visual environment in which to work. The children gained from their observations far more than by simply using text. How they used that information becomes the question. Was it to understand scientific inquiry or to be "entertained"?

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The Impact of Digital Technologies on the Elementary School Classroom

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Jan Nespor

Introduction

This discussion will provide a summary of the information obtained and lessons learned from a five months participant observation of technology at a public, intermediate school located in southwest Virginia[1]. In order to increase our understanding of the impact of digital technology on a typical elementary school classroom, we sought a situation in which we could observe students using traditional and newly integrated instructional media within their situated learning environment[2]. Likewise, we sought a situation in which we could observe and interact with teachers as they move between traditional and digital technologies.

The school we selected for our research was ideally suited for several reasons: (1) one of the authors, Jan Nespor, had already spent several months constructing relationships with the principle, teachers, staff, and students at this school for other research interests; (2) this school encouraged its teachers to experiment with technology and teachers' efforts to incorporate new technologies were encouraged, praised, and modeled; and (3) this school practices a "whole language" approach to teaching which emphasizes student collaboration and cooperative group work and de-emphasizes direct instruction.

This paper describes: (1) How the classrooms we observed were physically adjusted to incorporate new digital technologies. (2) The context and content areas in which students used these technologies (based on observation, teacher interviews, and teacher responses to a final survey). (3) Teacher and student attitudes towards increasing use of digital technologies in the classroom.

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[1] This research was partially funded by a Minigrant received from the College of Education at Virginia Tech.

[2] By *situated learning environment* we are referring to the definition of this concept by Brown, Collins, and Duguid (1989) which suggests that a situated learning environment is one where learning is an active process which takes place in the context of a realistic setting.

Background to this Study

The emergence of digital communication has led to many dramatic changes in how we seek, store, and share information. The adoption of electronic discourse as a more common mode of communication is changing the traditional concept of reading to include non-printed texts such as computer and television screens and movies. Observing the impact of electronic technologies on how teachers and students work together requires careful consideration of the physical indicators of change as well as looking at individual, personal, psychological, and philosophical responses to change.

Current analysis of the impact of electronic technologies on the organization and structure of schools reflects the depth of influence networked digital technologies will have on the organization of school environments: "Simply hooking teachers and/or students together via network communications is insufficient; developing engaging dialogues requires a carefully structured social organization of technology" (Hawkins, 1993, p. 30). We chose to explore how the classrooms respond to new technologies by observing activities in real classrooms to see how new digital technologies affect the ways teachers and students work together.

Physical Adjustments to Incorporate New Technologies

Each of the classrooms in this school have the student desks arranged in small group clusters combining five to six desks. This layout facilitates student group work and variable pacing of tasks and activities that occur throughout the day. Figures 1 and 2 illustrate the cluster of three or four computers isolated at the back or off to the side of the room to form a separate group work area which students may use individually as their work is completed or move to as a group to fulfill an assignment involving use of the computer.

However, just as computer technology continues to evolve making brand new equipment dated within a few months, the organization of the classrooms we observed was not static. The school introduced a new multimedia system which was situated on a movable cart. A picture of this system is shown in Figure 3. At first, this multimedia system (which included a MAC LCIII with CD-ROM

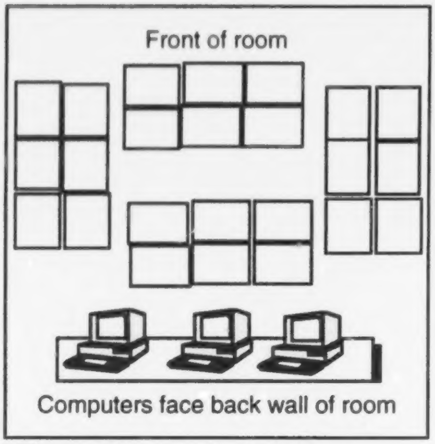

Figure 1: Layout of typical classroom showing computers placed outside the normal classroom group acitivites with not enough computers present for a normal-sized student group to work individually on computer.

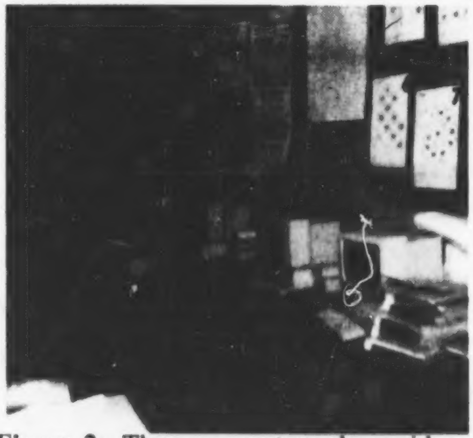

Figure 2: Three computers along side wall of classroom

drive, scanner, and laser printer) was located in the principle's office and teachers, a select group of students, and the principle spent time getting to know what this equipment could do. With support, direction, and encouragement from the district technology supervisor teachers, students, and the principle began creating simple multimedia programs. Gradually the multimedia system was moved in and out of different classrooms for presentations or small group projects. Next year this school will have two more movable multimedia work stations so that each grade has a system which two or three teachers can share.

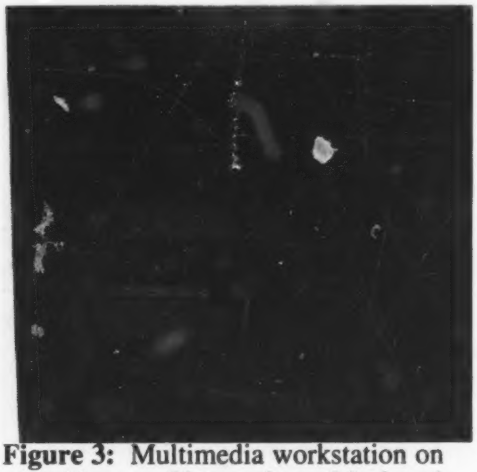

Figure 3: Multimedia workstation on movable cart. Picture shows Macintosh LCIII, (with keyboard and mouse) external CD-ROM drive, color monitor, laser printer, and color scanner. A video camera is laying on top of the scanner.

Teacher Responses Towards Computing in the Classroom

Teachers at this school seem to be using computer assisted instruction in nearly all subject areas. Those areas in which teachers felt that they didn't have adequate computer-based instructional material were in the subject area of health education. All teachers were using the computers in their classroom for *drill and practice*, *simulations*, and *word processing* activities. A few teachers were using interactive laser discs and CD-ROM programs with their students. Using these technologies took more planning and coordination with other teachers and with the school librarian because the laser disc player and CD-ROM player were not available in every classroom and had to be shared amongst two or three other teachers.

We also asked teachers: "How do you select technology-based instructional programs for your students?" Most teachers responded that they select their computer-based instructional programs based on what's already on the electronic network within the school. Recommendations by colleagues and software catalogs are also prevalent ways in which teachers select technology-based programs. As one teacher commented, she selects software on her own "when given a chance." Another teacher replied that, "I try to purchase materials that fit specific reading/writing needs of my students from companies whose reliability I am familiar with."

Instructional activities on the computer vary greatly in terms of the method of instruction, level of interactivity, use of visuals, amount of feedback, etc. We asked teachers to rate their students reactions to the following different types of programs: (1) drill and practice; (2) simulations; (3) word processing; (4) interactive laser disc; (5) hypermedia; and (6) information retrieval systems such as CD-ROM, VAPEN (a telecommunications network available to all public school teachers in Virginia).

All but one teacher responded that all students liked drill and practice exercises--one teacher responded that "some like it." The teachers who used computer simulation exercises with their students unanimously believed that all students like this type of computing activity, however, not as many teachers are using simulations as use drill and practice exercises. A smaller portion of teachers initiate word processing activities with their students, and teachers view student responses to this activity as much more mixed though still positive. Generally, teachers' felt that students like to do word processing on the computer.

The number of teachers using interactive laser discs, hypermedia, and information retrieval technologies with their students is considerably less. These technologies are new to the teachers. At this school there seemed to be several lead teachers who were comfortable with trying out new technologies and were very open with sharing their experiences with their peers. The principle at this school encouraged teachers to test out these new technologies and encouraged teacher collaboration and sharing at the weekly staff meetings. All the teachers at the school were confident that their students typically responded very positively to instructional activities using the computer.

We asked teachers whether they believed that all students respond equally well to computer-based instructional activities. As an extension to this question, we asked what individual traits seem to make a student more inclined to do better work on the computer than in other classroom activities? Teachers expressed diverse opinions in their response to this question--partly because each teacher seemed to interpret the question somewhat differently. The responses show each teachers' observation of her students as they interact with content material on the computer and suggest some areas worthy of further research:

> *No. I believe students who are* *not* *strong visual learners have difficulty...*
>
> *No. Interest level, fear of making a mistake may hinder or slow the student down in interaction with the computer but eventually they get involved. Teacher attitude toward computers may influence the student.*
>
> *Advanced in academic areas do better -- Chapter 1 students also do better -- Don't know why, but requires less stress with writing, etc.*
>
> *The students' initial understanding of a concept has an impact on their interest [in a] given software. There is still a need for direct instruction.*

Two additional questions we asked teachers addressed how teachers: (1) physically managed their students' work on the computer: whether they had students working primarily individually, in small groups, or used the computer to present information to large groups (the whole class); and (2) their own personal experiences using the computer for storing/presenting instructional material, communicating with peers, managing classroom records, and recreational activities.

We found that teachers primarily use the computer for individualized work and for small group activities. At this point in time, no teachers were using the computer for large group or whole class activities.

Nearly all of the teachers responded that they use the computer to present instructional material to their students. Nearly forty percent of the teachers reported that they also used the computer to develop instructional material for their students. A small percentage of this group of teachers are using the computer to manage classroom records, test scores, lesson plans, etc., but several teachers said they would like to do so in the future. Nearly forty percent of the teachers reported that they use the computer for recreational activities and other personal activities not mentioned. One teacher described herself as a "video game freak!!"

We asked teachers to describe what makes the new digital technologies so popular with their students. Many teachers thought students liked using the computer because it is like television and video games. Other teachers thought that the individualized interactivity provided students with helpful, immediate feedback. A selection of some of teacher responses illustrates the range of teacher attitudes towards computers:

> *A modality that is often new to them. Fits today's society - T.V.!! Nintendo!!*
>
> *When a student is working on computer, they are actively involved, get immediate feedback and [the activity] is more fun because most of the programs that I use have lots of graphics and games.*
>
> *The students get excited seeing their correct responses highlighted on the computer screen. The excitement increases when the transfer of knowledge is used with the computer.*
>
> *I enjoy allowing my students to experience technology as it is another medium to acquire or build knowledge of all subject areas. This also lays a technological foundation for the students' future. Children enjoy the technology as it is hands-on learning and is a different medium.*

Student Attitudes Towards Computing

We modified the survey distributed to the teachers and gave it verbally to small groups of students from the third, fourth, and fifth grades. The students we interviewed were all volunteers and were happy to be released from class for a few moments. Students were also intrigued by the notebook computer which we used to step through the interview questions. Despite these intervening variables, students seemed comfortable and eager to share their opinions.

When asked what subject areas are more suited to be taught via computer, students suggested science and math programs and seemed to unanimously agree on these. Some students seemed to love writing on the computer, and others clearly did not. Specific aspects of using the computer that students liked were: games, information searches, programs that give a reward of playing a game for an interval of time when they score well in a computing drill and practice program, and being able to search for definitions while reading.

Clearly what all students liked about computing activities is that they enjoy working on their own. In the students own words:

> *Being able to have a longer amount of time to play or learn by yourself, with the computer helping you learn.*
>
> *Other people sort of get in your way or tell you what answers to put in.*

All students we spoke with expressed a preference for being able to move through a subject area at their own pace. However, the students we interviewed recognize that computers are not as well liked by all their friends. The students who have more experience with computers suggested that some of their friends and peers "don't understand the technology and don't know how to use it."

How to Improve Instructional Applications of Technology in the Classroom

We asked teachers to tell us what they would wish for to improve instructional applications of technology in their classroom. Teachers' responses were fairly similar on this topic: more computers, more training, and more software. All the teachers responding to this survey had personal goals for improving their experience and comfort level with the new technologies. Some teachers also wanted to see their students having access to a computer at home so that they also would be more comfortable with technology.

Generally, teachers' responses to this survey were very positive and reflect the overall enthusiasm towards new technologies at this school. The attitude of the principal who encouraged teacher experimentation with technology also influenced the responses we received. However, moving to increased use of digital technologies is not easy and many teachers voiced their frustrations with some new equipment during conversations in the lunchroom or in private conversations. As one teacher commented in her survey: "Computers are very helpful when everything goes well. When there are problems, however, it seems that a lot of time is wasted."

The experience of observing teachers' use of technology at this school shows that within a supportive, collaborative environment, teachers are interested in using digital technologies in their classroom. The changes in the social organization of the classroom will come gradually as many issues in this regard are yet unknown. While one teacher emphasizes, "There is still a need for direct instruction." Another teacher looks toward ways to "Make teachers more at ease with 'lessening control' of direct instruction to let children use computers freely all day!" Both opinions suggest that as teachers incorporate more technologies into their students' learning environment, instructional uses of digital media will vary greatly.

Digital technologies can support many different styles of teaching and learning. Our observations of and discussions with teachers at one elementary school have shown that the same technology can be successfully used in different ways by different teachers. Students express an interest in exploring all avenues of digital technology because of its interactive quality and individualized pacing.

The portrayal of technology use in this one school described here represents a snapshot documentation of a moment in time. Teacher and student interactions with technology will be considerable more sophisticated even several months after these observations were made. We hope to revisit this school again and with students' and teachers' permission we will again capture a snapshot of attitudes towards and ways of using digital technologies in the elementary classroom.

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A Middle School's Experience with Hypermedia and Problem-Based Learning

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Are times changing? As of this writing, at least two states (Texas and California) have adopted curricular materials based on multimedia (A First, 1991). This has come about in part because newer hardware and software are both more powerful and less expensive. Mr. James Dezell (1993), President of EduQuest, says that multimedia is going to make core instructional software so compelling that our students are going to learn more. He also suggests multimedia will dramatically affect *how* students learn by creating new knowledge that demands application, promotes multiple points of view, engages active learners, eschews memorization, and is built with cultural tools.

For all of the excitement, however, many schools and teachers may move slowly in using multimedia systems. There are many reasons that may dissuade schools from employing multimedia. These include costs in terms of time, money, and lack of funding. In addition, few people have the combination of skills required to develop excellent (or even average) multimedia packages. Until recently most multimedia systems required two monitors, special interface cards, and an assortment of cables, players, and software. Until the prices of systems fall, and system requirements narrow to one standard unit, many schools may stay on the sidelines. Other extremely important issues that influence the adoption of multimedia are consideration of how teachers teach and how students learn. It is possible that the infusion of multimedia into the classroom will require abandoning traditional teaching paradigms.

Multimedia: Perils and Promise

One can encounter many definitions of the term multimedia. One definition includes a system that combines video, text, sound, animation, and graphics — all controlled by a computer. Hypermedia employs the same electronic forms as multimedia, but allows learners to access information in a nonsequential fashion. Critiques of hypermedia usage have mentioned difficulties in navigation and overloading of short-term memory (Conklin, 1987). Heller (1990) suggests that a lack of motivation or unfocused rambling may also occur.

The purpose of this study was to investigate methods that capitalize on the wealth of information in hypermedia databases, support sustained student learning activities, and occur in an atmosphere in which students learn significant skills in reflective thinking, and go beyond the input-recall state, into higher levels of thinking. We used an inquiry based problem solving model to create a context for sustained student activity. The model began with the introduction of a discrepant event. We focus on this issue.

Thinking Skills and Structured Inquiry

How do we get students to solve problems, think critically and creatively, make inferences, plan, hypothesize, generate independent solutions, and/or make decisions? These processes may need supporting activities such as "...defining situations, setting goals, formulating plans, comparing alternative courses of action, judging difficulty, apportioning time, and monitoring results" (Prawat, 1991, p. 4).

There is a wealth of literature on developing critical thinking skills, but the answer appears to be that we teach them (Resnick, 1987; Sternberg, 1984). Perkins (1986) suggests that we try to teach too much content to the neglect of those tactics needed to become better thinkers. In fact, Perkins avers that good thinking is an unnatural act. It is unnatural, he suggests, because, if left alone, human thinking tends to manifest three weaknesses: (1) taking egocentric approaches that incorporate biases, (2) suggesting problems before defining the problems, and (3) treating knowledge as information as opposed to knowledge as invention.

Prawat (1991) says that the most prominent technique of teaching thinking skills is to embed skills into the curriculum — or within the context of specific subject matter domains. This method blends an equal balance of thinking skills and subject matter. The importance of this approach is that learning and thinking are thought to result from an interaction between a learner and a situation rather than something occurring in a person's mind (Greeno, 1989).

Another useful way of creating a context for learning is through "situated cognition" (Brown, Collins & Duguid, 1989; Greeno, 1989). Brown, Collins, and Dugid contend that students need more than abstract concepts and canned examples. They suggest that learning should be conducted in activity situated in real-life social, cultural, and physical contexts. Research conducted by the Cognition and Technology Group at Vanderbilt (CTGV, 1990) is a good example of the use of media (videodisk) to "situate" or "anchor" students within a learning environment.

Having introduced the concept of embedding thinking skills within the context of subject matter, we now introduce an inquiry based problem solving model which is preceded by a discrepant event. The model is based on Piaget's (cited in Chapman, 1988) concept of disequilibrium and Festinger's (1957) concept of cognitive dissonance. Festinger (1957) suggested that individuals strive for internal consistency. When learners experience inconsistencies, psychological discomfort results. Festinger's theory provides us with this theory: "The existence of dissonance [inconsistency], being psychologically uncomfortable, will motivate the person to try to reduce the dissonance and achieve consonance [consistency]" (p. 3). Central to this argument is that introduction of new information may create cognitive elements that are dissonant with existing cognition. All that is needed is a means by which dissonance is created in learners.

Discrepant Events Within Inquiry

A spark is created with presentation of a puzzling situation or event. Nussbaum and Novick (1982) state that in order for accommodation of a new concept to occur, students must first recognize a problem as well as their inability to solve it. Students' inability is brought about by presentation of a "discrepant event." A discrepant event is simply an inexplicable condition, statement or situation. The discrepant event creates a state of disequilibrium (or cognitive dissonance as discussed above). The key in Nussbaum and Novick's argument is that once students are in a state of disequilibrium, they are motivated by "epistemic curiosity" (Berlyne, 1965) to reduce the disequilibrium. Nussbaum and Novick (1982) suggest that traditional instruction seldom provides for students to experience cognitive conflict.

Bruce and Bruce (1992) suggest that logic-defying problems often place us in a state of disequilibrium. Motivation from the disequilibrium causes *questioning, snooping,* and *searching* to reduce uncertainty and re-enter a state of equilibrium. Accordingly, Bruce and Bruce offer an inquiry model to take learners through five phases in their quest to reduce disequilibrium:

(1) Discrepant Event. Students read or are presented a discrepant event. From it, they generate a problem question. Discrepant events, or situations such as them, have received frequent attention in the social sciences. Costa (1991) states that the inquiry method purposely creates situations to extend reflective thinking. Massialas, Sprague, & Hurst (1975) offer several devices to get students' attention and involvement. Their suggestion is to use "springboards." Springboards can take such forms as documents, magazine articles, graphs, and visual media. They cite a multimedia unit entitled *World History Through Inquiry* that draws from several disciplines to get students to examine and discuss issues. Massialas et al. also suggest using "puzzling documents" that lack critical facts and conclusions or include discrepancies.

(2) Generate Questions. Students create a series of questions that can be answered with a "yes or no" response. Making them create a yes or no question causes students to organize their thoughts. This way the learners are probing for specific information instead of general, subsuming types of questions.

(3) Gather Data. Students gather data to answer questions about important variables and ask hypothetical and causal questions.

(4) Analyze Information. Students analyze their information to reach a hypothesis.

(5) Self Evaluation. Last, in a metacognitive mode, students review the entire process.

Hypermedia Data Base

We developed a hypermedia data base incorporating scanned color images, graphics, text, and audio. The domain for the prototype was the ancient Mesoamerican civilizations. The original focus was the Aztec Empire. As the project developed however, the data base expanded to include brief references to other peoples such as the Mayas, Incas, and Olmecs. This topic was excellent for a seventh grade social studies class. Because most sources about ancient Mesoamerica are post-Colombian, there are a variety of conflicting opinions, interpretations, and thoughts about the subject matter. These result from the Spanish destruction of nearly all pre-Colombian recorded history. What we know about these cultures was recorded by monks and Indian chroniclers after the conquest. This background provided a context-rich environment for higher-order thinking, especially in a social studies class.

Note. From "That fateful moment when two civilizations came face to face" by C. L. Mee Jr., 1992, *Smithsonian, 23,7*, p. 69. Copyright 1992 by Smithsonian Institution. Reprinted by permission.

The thematic hypermedia data base was developed around people, deities, places, things, and events. Our research began with the story of Cortés and the end of the Aztec Empire. It then expanded into the life and practices of Aztecs. Practices included their commerce, relations with neighbors, agriculture, art, architecture, and especially their proclivity for human sacrifice and cannibalism. As the research continued, it seemed natural to provide a background concerning the changing world during the "Age of Exploration" (the 16th century). It also seemed appropriate to expand into the other Mesoamerican peoples because of questions concerning the origin of all people native to the Americas.

Below Is a Scenario Encountered by Students

I. Discrepant Event. In 1519 Cortés, a Spanish sea captain with 550 men (including 32 crossbowmen, and 13 musketeers) and 16 horses, landed on the Yucatan Peninsula. This was the area of the Aztec, an empire that stretched from central Mexico to the present boundary of Guatemala. Within this area were 25 million people governed by Montezuma. Montezuma's capital city of Tenochtitlán quartered some 50,000 Aztec warriors. Within two years, however, Montezuma would be dead, Tenochtitlán would be in ruins, the empire would be in chaotic disarray, and the Spanish would control the area.

Students, assisted by problem solving steps, would generate a problem statement. Massialas, Sprague, and Hurst (1975) suggest asking questions to generate the problem definition. Such questions might include:

- What is this story really about? One possible answer might suggest that disaster struck millions of people when the complexities of cultures, societies, and technology clashed.
- What is the nature of the problem, or did anything unusual happen? A possible answer is: It doesn't make sense that a few men in ships could make a whole empire fall.

Based on an analysis of the event, an typical problem statement might be: How could such a small force of Spaniards cause such profound changes in the Aztec culture in such a short time? With that, the students are able to begin solving the problem.

II. Generating Questions. The inquiry model provided in the software now suggests students produce questions that can be answered with a yes or no response. Here are appropriate examples:

- Were the Spaniards' weapons superior to the Aztecs'?
- Is it possible that there were fewer Aztecs than originally thought?

- Did religious beliefs affect the outcome?
- Did Spaniards bring some type of disease?
- Did Spaniards have a superior form of warfare?

III. Gather Data . Using the hypermedia data base, plus other references, students search for answers to their "yes or no" questions. At the end of this step, they are closer to hypothesizing causes of the discrepant event. Students are not left on their own to wander aimlessly about hyperspace in search of answers. The system contains guides to offer suggestions about the most likely place to search; there is also a "Journal" for record keeping.

IV. Analyze Information. Students are now in a position to analyze the data and generate a hypothesis or hypotheses. In this particular case, their hypothesis might take this form: Cortés was extremely lucky; he took advantage of Aztecs' superstitions and religious beliefs which indicated he and his men were gods. He was fortunate to find Donna Marina, a native who quickly learned the Spanish language. Cortés also enlisted the aid of thousands of local Indians who were glad to find a way to overthrow Montezuma. The Spaniards' weapons were especially effective against the Aztecs who were not used to "total warfare." The Indians were terrified of armored soldiers mounted on horseback.
The Aztecs suffered grievously from diseases brought by Spaniards. And last, the city of Tenochtitlán was easy to blockade and starve into submission.

Note. From *The Course of Mexican History,* (p. 127) by M .C. Meyer & W. L. Sherman, 1987, New York: Oxford University Press. Copyright 1987 by Oxford University Press. Reprinted by permission.

V. Self Evaluation. Following the inquiry based problem solving model, students now evaluate their problem solving strategies. Bruce and Bruce (1992) suggest that developing evaluative skills improves thinking and questioning during future problem solving situations — hence, providing for skill transfer. Here is a list of appropriate evaluative questions provided by Fontana, White and Cates (1992, p. 12):

1) Is the data relevant or necessary to proving or disproving the hypothesis?
2) Has sufficient data been collected?
3) What is the source of each piece of data? Is the source credible? Is it reliable?

4) Does any piece of data incorporate bias or narrow points of view?
5) Does each piece of data make a persuasive and logical argument?
6) Are stereotypes represented?

Purpose and Rationale

This study looked at the following question: Does the inquiry based problem solving model support sustained exploration of a multimedia data base?

Method

An extant seventh-grade class of 24 students served as participants during the week-long study. Students were divided into four groups of six. Assignment of students was not random, so results of this study may not generalize to others of the same age and background. Groups were formed by the teacher before arrival of the observers. Although ability tracking had been discontinued in this particular middle school, this class was chosen by the teacher because she thought there would be the closest match between proposed methods and the personality of the class. Students were assigned the roles of leader, researcher, computer operator, and recorder.

Means of gathering data consisted of direct observation, videotape, audiotape, post-exercise questionnaires, and evaluation of students' products. Each group had a research assistant who served as both a facilitator and evaluator. Researchers used a model by Massialas, Sprague, and Hurst (1975) to analyze students' engagement. Here are the objectives provided by Massialas et al. pertaining to the research question:

1) Showing interest. Students are willing to give their attention or have a positive attitude in using the system to resolve discrepant events. Students' attitudes or interest may be observed in some of the following ways: "listening, being excited about something, coming up after class to talk about the issues" (Massialas et al., 1975, p. 149).

2) Showing involvement. Students go beyond the level of just showing interest. They commit themselves to an activity by using their own initiative to participate.

Results

Nearly all indicators, facilitator observations, videotape, audiotape, teacher observations, and student questionnaires, indicated students were motivated and engaged in sustained activity. Students came into the classroom and began work without being told to do so. Work continued until the very last second, then students hurriedly grabbed their belongings (as if they were about to late) and left for the next class.

Students' desire to know appeared to be ignited from the discrepant event. Just as the literature indicated, it seemed the discrepant event served as a springboard to sustained activity. One student in the pilot study said the problem solving sequence was "fun and exciting, just like solving a mystery." This doesn't mean that the problem solving model was followed to perfection. The students, however, were heavily engaged in the problem solving process as soon as they received the discrepant event. The facilitator from Group 2 commented that her students were motivated and never lost interest or seemed bored. Group 2's facilitator also reported that her group was so proud of their work that they asked over and over if they could share their results with the others. Behavioral problems did not exist, and the group wanted to get through the problem so they could get into another.

The teacher reported that this whole approach exposed students to new worlds of thought and approaches to learning. In her opinion, the discrepant event approach got the students so involved that they wanted to both continue the exercise and share notes with each other after this study was over. The teacher reported that the students were just "full of themselves." By this, she meant that the students were fully absorbed in the puzzling situation and wanted to keep working at refining their hypotheses. She said they bounced ideas off of each other outside of class. During the week after the exercise, they still wanted to share information with the rest of the class.

In Group 4 there was one exception to the generally excellent use of the discrepant event. The facilitator had a particularly difficult time in getting this group to confront the discrepant event and develop a problem statement. This difficulty appeared to arise from the selection of a group leader who maintained that he knew the answers and did not need to pursue the matter. Whether the recalcitrant student had a history of being combative, or whether the discrepant event was not challenging enough is unknown. The discrepant events certainly appeared to be challenging and perplexing to the other groups. The teacher did say that Group 4 was composed of particularly strong personalities. This group leader's preconceptions evoked thoughts of Gardner's (1991) suggestion that educators have no idea how pervasive and strong are initial conceptions, stereotypes, and scripts that students bring to the classroom. Gardner maintains these preconceptions are difficult to refashion or eradicate.

Discussion

With the exception of Group 4's initial difficulty, the students were engaged, motivated, displayed curiosity, and had fun. It would be fair to question, however, whether there were other contributing factors to students' active engagement. For example, the novelty effect may certainly have played some role. This particular section of students may have experienced the "Hawthorne Effect" from being picked to participate in this study. The classroom had been rearranged, and students were told they would be participating in a study. Four color computers, four audio recorders, one video recorder, and four researchers were present to record students' actions. Students were placed into groups and assigned roles (an exception to common practice). They were then given paradoxical statements about people who lived over 400 years ago. These people were known to be fierce and warlike. They sacrificed thousands of individuals at a time and ate some or all of the remains (depending upon whom one believes). The exercise was to last only one week and it was to be presented by methods the students had never seen. It is also possible that events occurring in the classroom before we arrived contributed to the observed results. That is, the history of this teacher's interactions and pre-study comments to the class were unknown. Last, the students were probably aware that Aztecs and Maya were their teacher's favorite subject and that she expected them to think and devote their energies to this study. All of these variables may have contributed to the students' interest and motivation.

Another way of looking at the discrepant event inquiry model would be under the umbrella of "anchored instruction" or "situated cognition" (Brown, Collins, & Duguid, 1989; CTGV, 1990). Using the discrepant event, students were introduced to a context that had meaning, a purpose, and a direction for engaged activity. As soon as the "Puzzle" was read, students had the context of a specific subject matter domain. Their observed behavior indicated continuous, purposeful pursuit until resolution of the discrepant event. They researched, took notes, hypothesized, then supported their hypotheses in open discussion. They then eagerly anticipated, and in fact asked for, permission to engage in the next discrepant event.

Can we state that the discrepant event inquiry approach provided motivation for sustained learning activities? No. Many students appeared to view the reading of the discrepant event as the beginning of an adventure and the data gathered in this study seemed to support the literature. Specific contributing factors to motivation, however, were difficult to identify. The facilitators and the teacher were encouraged from using the inquiry based problem solving model, but generalizing the success in this study to other classrooms and situations would be inappropriate.

Implications for Education

The goal was to create a functional system in a classroom that included a facilitative teacher, energized students, a hypermedia data base dealing with Mesoamerican Indians, additional subject matter resources, and methodology designed to sustain student task engagement. In many respects, this goal was reached. Students were involved throughout the week in learning a problem solving model (process) and Mesoamerican history (content). Although we could not narrow student interest, motivation, or activity to a specific factor, the inquiry (problem solving) model preceded by a discrepant event appears to at least be among the factors contributing to a meaningful learning experience. While this study was narrowly focused, we envision using this scenario for interdisciplinary studies. We could easily have involved the disciplines of English, science, geography, social studies, history, and math in the content of the exercise. We are optimistic that this approach offers both opportunities for further research, and a means of facilitating integration of technology into the classroom.

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Issues in Identifying Visually Gifted Young Children

Barbara Fredette

VISUAL LITERACY IN THE DIGITAL AGE is the title given to the conference at which this paper was presented. To make a connection between this generic focus and ISSUES IN IDENTIFYING VISUALLY GIFTED YOUNG CHILDREN takes some stretch--one which I would like to attempt through analogy.

In his book, *The Reconfigured Eye*, William Mitchell (1992) describes the evolution of the production of imagery through three critical phases. The evolution is from painting through photography to digital imagery. "Although a digital image may look just like a photograph when it is published in a newspaper, it actually differs as profoundly from a traditional photograph as does a photograph from a painting. The difference is grounded in fundamental physical characteristics that have logical and cultural consequences" (p.3). Are children's drawings most like paintings; naive artistic expressions, are they like photographs; an attempt to represent a realistic window on the world, or are they most like digital images; combines of imagery from internal and external sources? The stance taken in identifying in which of these niches the visual expressions of children belong also has potent consequences-consequences which affect the identification of children who have exceptional ability in this area.

This paper is organized around a set of identification issues addressed as questions. These questions serve as the search mechanism which drives the study at this point in time. The purpose of this study is to examine issues engendered by the construct of "visual giftedness" in order to select a focus for further research.

1. Is artistic talent synonymous with visual giftedness?

I have found that when teachers are asked if they know any young children who are visually gifted they make an immediate connection to performance in art class or art related activities. A computer search of library holdings under the keyword visual giftedness revealed the same connectedness between the two terms--the research studies identified through the term were of artistic giftedness. A search through subject indexes in shelves full of books on Giftedness in Children produced no uses of the term visual giftedness. It appears that visual giftedness is not a term that is used in identifying or describing exceptional capabilities in young children. In defending the importance of art (as visual thinking) in the learning experience of young children visual thinking authority McKim (1972) makes the same union; that is that the visual thinking of young children is in art activity. However he seems to differentiate between the two to some extent when he concludes his defense by writing, "Although visual abilities are not democratically endowed, differences in inherited aptitude do not afford a rationale to deny visual education. Whatever the inheritance the unrealized potential for visual development is great" (p. 24). The overwhelming evidence implies that the search for exceptionality of the visual mode of thinking in young children is tied to artistic talent.

What is artistic talent?

The 1972 Marland report to Congress on the Education of the Gifted and Talented was used in the Gifted and Talented Children's Education Act of 1978 as part of Public Law 95-561. This public law identified visual and performing arts as one of five categories of giftedness. However neither the report nor the law provided an operational definition of talent in the visual arts (Clark and Zimmerman, 1983). In his 1980 effort to describe artistic development Gardner gave a very general, not operational, definition when he wrote, "...any inquiry in art, and especially one concerned with the sources of artistic accomplishment, must necessarily confront the issue of talent--the status of those individuals who, owing to nature, nurture, or some indissoluble blend, possess special gifts" (p. 17). Later in the same text Gardner gets a little more specific about what talent might be when he describes the activity of the young child as "his preconscious sense of form, his willingness to explore and to solve problems that arise, his capacity to take risks, his affective needs which must be worked out in a symbolic realm--that we find the crucial seeds of the greatest artistic achievements" (p. 269). To the extent that some children might exhibit more of these abilities/attributes than others they might be identified as artistically talented.

Another source for operationally defining talent may be found in the study of prodigies. Developmental psychologist Feldman (1986) has studied prodigies. He tells us that "Prodigies are more likely to appear if the knowledge base of the domain is highly organized formally and highly concentrated symbolically. Music, chess, and mathematics share this feature while visual art does not" (pp. 87-88).

It has been suggested that one of the reasons for this is that young children do not have the physical development (eye-hand coordination) necessary for the production of art. However this argument is contradicted by the fact that young children can play the violin and piano. Feldman (1986) offers another explanation by stating that "the technology and techniques for composition and performance are more organized and accessible to the young musician. There are also clearer criteria for excellent performance " (p. 84). This may be why early precocity in art is generally not represented in the research literature. Precocious development in graphic forms of artistic expression is not considered to be a sign of giftedness until it reaches the symbolic stage which offers pictorial representations of the environment. Even then there is limited consensus on criteria for standards of excellence in the visual arts. This makes judging the products of young children's graphic performance on the basis of representing exceptional artistic achievement rather difficult.

The problems of identifying precocious artistic expression could be avoided by calling children's graphic expressions (drawings) visual thinking rather than artistic thinking. Goodnow (1977) refers to childrens graphic work as "visible thinking". She suggests that the features it represents are generic features of problem solving. To call the problems they are solving artistic problems may be assigning an untoward limitation on that mode of thinking.

What problems, if any, may accrue from calling the visual expression of children 'art' rather than visual thinking? Children's writings and childrens drawings represent two complementary cognitive efforts using two different forms of information and, possibly, different modes of mental activity. We accept their writing as an exploration of verbal language--we do not call these efforts literature. However most explorations using graphic media are labeled art. This label carries heavy cultural connotations which in turn may influence perception of the products called art. It may be useful to put aside the label 'art' and identify drawings as drawings--not art. This is not a vapid exercise in semantics--it is an attempt to free and to focus. To free the review of the graphic products of children from domination by adult held connotations of art and to focus on these drawings as representations of developmentally appropriate or developmentally exceptional visual thinking.

In examining children's drawings which represent these developmental stages it is also possible to look for exemplary uses of the visual mode of thinking. Children's development in graphic expression, drawing, represents development in visual thinking--an effort toward visual literacy. Drawings may be manifestations of a variety of related capabilities within the visual thinking mode. Using as an heuristic notion the paradigm of age related developmental stages in drawing achievement it is possible to identify those children whose efforts are prodigious, far beyond the expectations set by the stages.

2. In what contexts may this ability--visual giftedness--emerge?

Opportunities to express visual abilities may occur wherever and whenever young children have the chance to express their ideas in visual form. Such opportunity is requisite to the identification of children who may hold this ability (or set of abilities) at an exceptional level. It is generally expected that more opportunity is available in art class than in the general academic classroom .

This is not always the case for several reasons. Art teachers have limited time with students, especially at the primary level. In many schools where there are art teachers, the art teacher meets each class once a week for less than an hour. Elementary art teachers are frequently itinerant and teach in several schools. In the course of a week they may see several hundred students. In spite of these problems experienced art teachers may recognize exceptional ability in young children but can do little about it because of the need to follow a specified curriculum.

In contrast to these conditions the classroom teacher has more flexibility of time and more opportunity to recognize individual differences in abilities among the students in her class whom she will see every day for the year. In those classrooms where children are expected to express a wide variety of ideas in any of the symbol systems of our culture, those who consistendy select to do it in a visual mode may be recognized. Besides the frequency of efforts the products of these efforts may also be observed, by a visually sensitive viewer, to demonstrate an exceptional visual memory and skill of creative visual problem solving.

However in classrooms where rule driven activity is the major mode of expressive opportunity, exceptional visual ability is less likely to be observed. It may even be counterproductive for the children who have it. An example of this problem was observed in a first grade math class. The teacher was showing the children a picture of several rabbits in a garden setting. She asked how many bunnies there were in the garden. Several children came up and counted them, arriving at the correct answer. Michael did not. He said there were nine bunnies, not seven, because he knew two were hiding behind the fence. The teacher was very upset with Michael and reprimanded him for trying to be a 'smart aleck'. He was very upset when he arrived home and told his mother what had happened. He even drew a picture, replicating the one the teacher had shown the class. In his picture he showed (x-ray style) where the two rabbits were hidden. By October Michael knew--he had learned--that he was not to read pictures imaginatively. Reading pictures imaginatively by adding to or elaborating on what is represented is a visual thinking skill which should be encouraged in appropriate contexts.

Exceptional visual abilities may be exhibited both in children's own visual productions as well as in their response to images found in pictures and in the visual environment. Although their skills with language are not highly developed some young children show a surprising ability to recognize patterns, to see and make (concrete) analogies . Given opportunities to talk about pictures and adults who are open to seeing through the eyes of a child it is possible to recognize when this ability is present to a high degree. Teachers need to understand the importance of visual thinking skills as life skills. They need to be aware of what behaviors and what characteristics of children's products represent this type of thinking so that in turn they may acknowledge and encourage through appropriate activity those children who exhibit exceptional abilities in it.

3. To what extent does visual giftedness represent a specific type of intelligence?

Gardner (1993) tells us that "In a traditional view, intelligence is defined operationally as the ability to answer items on tests of intelligence " (p. 15). The notion that a measure of the degree of general intelligence held by students would be a good indicator of their success in school has been with us since Binet developed his test in 1900. The test, or subsequent variations of it, provides an intelligence quotient or IQ. "Much evidence contradicts the existence of a relation between intelligence test scores in their upper ranges and giftedness (Sternberg and Davidson, 1985. p. 102).

Getzels and Csikszentmihalyi found that artistically talented college students did not differ significantly from typical college students in intelligence but that they would be at least in the upper third of their age group. In their study Getzels and Csikszentmihalyi found that the ability to identify good artistic problems was a better indicator of exceptional artistic ability than IQ. Sternberg and Davidson (1985) cite a study of young children in which it was found that "accuracy in representing real objects artistically is not correlated with general intelligence" (p.64).

Sternberg and Davidson (1985) sum up the findings of developmental theorists (J. Bamberger, D. Feldman, H. Gardner and H. Gruber) who have looked specifically at the gifted by saying that they "... seem to agree upon the importance of both individual talent and the context in which it develops. They believe in the domain-specificity of talent and, hence, do not see giftedness as having much to do with exceptionally high levels of IQ or any other single personal characteristic. Moreover, they tend to emphasize the systematic nature of the development of giftedness, with only part of the system emanating from the individual. For these theorists, "giftedness cannot be understood solely as a cognitive trait, but rather must be understood as a complex interaction between the individual and a peculiarly supportive environment that the individual helps create, but over which the individual has only limited power" (pp 57-58).

In contrast to the notion of a GI or general intelligence, Howard Gardner (1983, 1993) has created a theory of "multiple intelligences". This research effort was engaged in response to what he considers to be two major erroneous assumptions about human cognation; one, that cognition is essentially unitary and two, that "individuals can be adequately described and evaluated along a single dimension called 'intelligence'" (1991, p. 80). His research led him to identify seven different intelligences. In order to qualify as an intelligence in his theory the human capacity being considered had to "feature a clear-cut developmental trajectory, be observable in isolated forms in populations like prodigies or autistic youngsters, and exhibit at least some evidence of localization in the brain" (pp.80-81).

Spatial intelligence is one of the seven intelligences in Gardner's theory of MI (multiple intelligences). In *Frames of Mind* (1983) Gardner writes that "central to spatial intelligence are the capacities to perceive the visual world accurately, to perform transformations and modifications upon one's initial perceptions, and to be able to recreate aspects of one's visual experience, even in the absence of relevant physical stimuli" (p. 173). Gardner describes spatial intelligence as "the ability to form a mental model of a spatial world and to be able to maneuver and operate using that model. Sailors, engineers, surgeons, sculptors, and painters...all have a highly developed spatial intelligence" (1993, p. 8). All of these domains employ spatial problem solving. After infancy each of the intelligences is encountered developmentally through a symbol system. Children display their abilities in the various intelligences through their understanding and use of the various symbol systems. "The spatial intelligence passes from the mental maps of the infant, to the symbolic operations required in drawings" (p.28).

When Gardner addresses the question as to whether there is a separate artistic intelligence he refers to earlier work and writes " according to my analysis, there is not (1993, p. 138)". "Technically, however, no intelligence is inherently artistic or nonartistic. rather, intelligences function artistically...to the extent that they exploit certain properties of a symbol system...the same "spatial" intelligence may be exploited aesthetically by a sculptor, nonartiscally by a geometer or surgeon....Whether an intelligence is used artistically is a decision made by the individual and/or by the culture"(p. 46). Whether such a decision is made by the individual or the culture it is no doubt based on a consensus of what it means to be artistic. This consensual understanding comes about as a result of formal education. However the earliest manifestations of spatial intelligence may be found in the drawings of young children prior to formal instruction in the visual arts. It is my thinking that these drawings may represent exceptional facility with this type of intelligence without being assigned the 'baggage' of the label 'artistic'.

4. Can classroom teachers identify the visually gifted or is it up to art teachers alone?

Is it possible for people who have limited expertise in visual arenas to be able to recognize the visual skills that may be demonstrated in children's drawings? Two aspects of the behavior of classroom teachers are particularly relevant to this issue. One is the opportunities they provide for the students to exhibit visual as well as other skills and abilities and the second is the expectations they have in response to childrens' performance within these opportunities.

The expectations of teachers have a great deal of influence over the childrens' abilities which will be revealed in their classrooms. As mentioned before opportunities to express visual thinking must be available. The teachers who provide these opportunities must be able to interpret the results appropriately. What do teachers expect of pictorial representations, and do they assign this expectation even when the pictures are drawings made by children? Problems of adult standards in projection and interpretation may interfere. Teachers must operationalize, through sensitive acknowledgement, their understanding that a children's drawings are "windows on the mind" and not "windows on the world".

Classroom teachers may provide opportunities and they may recognize at least the child's exceptional ability to draw representationally, but they may not value it in comparison to academic performance. This is where the recognition of spatial ability as an intelligence worth nurturing should be brought to their attention.

The purpose of identifying the visually gifted during the primary years is to reinforce this type of behavior before the student's transition to years when peer influences and other factors may serve to diminish it.

Art teachers as identifiers

To the extent that art teachers recognize the intellectual efforts represented through children's drawings, they will be able to identify those children who have exceptional ability. Product technique-oriented teachers may not do as well. Gardner (1993) suggests that the arts must be taught by people with a "deep knowledge of how to 'think' in an artistic medium...education in the visual arts must occur at the hand--and through the eyes--of an individual who can "think visually or spatially". Note that he does not write "think artistically" but instead refers to the 'generic' thinking skills used in producing art forms. Art teachers who themselves are adept at visual thinking and who have strong understanding of children's development in graphic expression may be able to identify the visually gifted in the primary grades. Again it must be acknowledged that this is a critical time for this identification.

5. What resources might help classroom teachers recognize the visually gifted?

The initial identification of the visually gifted cannot be left up to art teachers for reasons which have been mentioned before. Classroom teachers should be considered the first level of the identification process. They see the same children every day and have a clearer notion of the personality attributes which may be manifested visually by these children.

The education of classroom teachers must help them to be familiar with the mode of visual-spatial thinking and how it is revealed in children' drawings. In an Arts in the Elementary School course taught at the University of Pittsburgh to elementary certification students developmental aspects are focused upon through several activities which call attention to children's drawings. Much of the activity is based on Lowenfeld's theory of children's development in graphic expression. The instructors believe that a theory of childrens graphic development is an essential grounding for the ability to recognize the appropriateness of the various forms of the symbols children create at different stages.

These students have an opportunity to review and make a personal response to an article called "The Colorbook Craze". It reveals to them the negative influences of coloring- in activities. Activities which take away the child's own opportunity to develop visual symbols for his individual expression of ideas.

The students see and discuss a scripted slide presentation of one child's development in graphic expression. This is a case study approach following one child from age 3 to 11 with several digressions. A set of drawings from mentally retarded adults demonstrates the cognitive basis of the drawing effort. A kindergarten's illustrated memories of a field trip shows the results of a teaching strategy that encourages the active construction of knowledge and its probable carry-over into long-term memory.

These pre-service certification students are asked to collect a set of drawings from the classroom to which they are assigned for the term. In class using a sample set of drawings the instructors demonstrate how to identify developmental qualities and analyze them in terms of Lowenfeld's stages. They also provide the students with a page of drawings of people which concretely exemplify the evolution of the symbol for a person from "tadpole" figures to naturalistically proportioned representations.In small groups they analyze one of the sets they have collected by sorting it into developmental levels based on the visual characteristics of the drawings. The instructors and peers assess this analysis, giving feedback and recommendations for change where necessary. Each student then writes a one page analysis of the developmental levels exhibited in the set of drawings which s/he has collected.

The instructors believe that these activities provide an appropriate preparation for apprentice level recognition of children's development in graphic expression. As certified teachers, they must be able to recognize what may be generally expected of children and use these criteria as a basis for identifying those who exhibit exceptional behavior in that area. "We need to educate or reeducate teachers so that they can recognize in childrens' visual products the work of a high level intellect. We need more teachers who can use visual products as assessment tools and who recognize in the visual products of students evidence of high level thinking products" (Fredette & Hunter, 1993, p. 404).

In order to do this, developmentally appropriate dimensions for the identification of young visually gifted must be identified. A set of characteristics observable in children's drawings must be developed and classroom teachers trained to use it. In order to move toward this goal, this author has begun to look at the following sources for specific characteristics of drawings for an efficient, effective index that may be used to identify visually gifted students.

6. What characteristics of young visually gifted may be observed in their drawings?

Clark and Zimmerman (1983) provide a detailed review of 70 years of identifying students with exceptional abilities in the visual arts. After they reviewed all of the relevant studies of the identification of the artistically gifted Clark and Zimmerman (1983) submitted that one of the questions which remains is how early can artistic talent be identified?

This author's concern is for identifying visually gifted at an early age. Perhaps what becomes visual art talent is first seen as exceptional ability to express ideas through drawing. Drawing is a cognitive or intellectual act as well as a physical skill and an emotional expressive outlet. " The ability to construct and act upon mental representations is regarded as the most fundamental property of human cognition" (Kauffmann cited in Hubbard, 1989, p. 5). These actions refer to the symbolic strategies which children use and represent in their drawings. What do they look like? And is it possible to develop a set of observable characteristics into a system of attributes which classroom teachers may be able to recognize?

Wilson and Wilson (1982) identified a number of characteristics of artistically gifted children. Several of the abilities they have identified have strong overtones of visual thinking competency. The first and most important characteristic is that the child frequently and persistently uses drawing to give visual form to ideas. Others include:

*ability to depict accurately and competently beyond that of peers.

*unusual visual memory enabling them to remember in "vivid and accurate detail" pictures and environmental objects and events in their environment.

*use of active imagination through fluent combinations of what they have known and seen by synthesizing into new forms.

*extraordinary ability to solve graphic problems by representing different points of view, different spatial orientations.

*personal agenda of skill which may be seen as ideas developed through pages of variations.

*early self-motivated ability to mimic styles, contents and techniques of adult artists.

As mentioned before, all of these characteristics appear within a developmental construct which serves to ground the identification of exceptionality. It appears that the identification should be made by examining many work samples that naturally evolve in ongoing classroom activities rather than from responses to test situations (assigned topics for drawing).

To the extent that drawings are symbolic manifestations of children's thinking strategies they may also represent the active construction of their knowledge. Several areas in which this may be most evident have been identified by Hubbard (1989) in her ethnographic study of visual and verbal literacy development in a first grade. Giving visual form to these concepts and doing it in an exceptional manner may provide another set of filters by which children's drawings can be examined for outstanding attributes of visual thinking ability.

TIME depictions: do some children make an effort to represent time events in their drawings?

SPACE depictions: size differences to indicate 3D space, transparency or x-ray, overlapping mixed perspectives as exploration, bird's eye view and elevations.

MOVEMENT depictions: multiple images, frozen moment, action lines, pop-ups, pictorial metaphor (adding legs or arms to objects to represent ability to move (Friedman & Stevenson, cited in Hubbard (1989).

COLOR as light: depiction of shadow, of other light effects, sparkleused in accurate depiction of detail.

COLOR as mood: cultural or symbolic representations (Hubbard, 1989,p. 138).

These two sets of characteristics will be used to identify areas of representation through which young children's visual thinking may be recognized and ranked in terms of exceptionality compared to peers or to developmental expectations.

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Children's Response to Silhouette Illustrations in Picture Books

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INTRODUCTION

Silhouettes and silhouette illustration have, from ancient times, been used to tell a story or record an important event. They may be seen in the artifacts of early civilizations, Chinese puppet theaters, Egyptian tomb decoration, and Grecian vases. The silhouette technique, in primitive and sophisticated forms, has continued in use to the present day.

When events such as marriage, birth, and family gatherings were recorded, silhouettes were often included as a part of significant documents. Portraits painted by artists or itinerant painters were the wealthy family's way of preserving likenesses for future generations, before the development of photography in the early nineteenth century. The middle class family could not, perhaps, afford a portrait, but they could elect to have their silhouettes made. Many artists in the late eighteenth and early nineteenth centuries painted silhouette portraits of individuals or entire families, for a fraction of the cost of a portrait in oil.

This technique was also admirably suited to book illustration; silhouettes of people, places, and things appeared as full page illustrations or as decorative motifs. They could carry the narrative of a story and were useful in identifying unique characteristics of a person or object. When color printing became fairly widespread, black and white silhouette illustrations were no longer so useful. And yet at intervals they reappear, sometimes as black and white and sometimes as colored shapes in a figure/ground aspect.

What is there about silhouettes that we find intriguing? Does a silhouette limit the viewer's response or can it move the imagination beyond what is there?

In the last few years (1990-1993) there seems to have been a renewed interest in the use of silhouettes for picture book illustration; the literature ranges from a description of the historical development of silhouette illustration (Cleaver, 1991) to discussions on introducing children to the concept of shadows (McDonald, 1993; Eberhart and Sabatino, 1991). In Paul Fleischman's *Shadow Play*, the illustrator, Eric Beddows, uses silhouette illustrations but also shows pictorially how silhouettes and shadows are formed. Readers see a shadow puppet theater first from the viewpoint of the audience, where the figures on the screen are seen as moving shadows and their silhouettes tell the story. Then the reader views the same scene from the actors' point of view and sees puppets on sticks being manipulated by people. One is the real image, one is the shadow or shade of the image. This shade or shadow is the silhouette.

Shape has been shown to be a primary organizer in children's response to visual stimuli (Hurt, 1991; Pettersson, 1989; Macbeth, 1974). While studies such as these offer valuable insights into children's perceptual responses, it cannot be assumed that because the silhouette technique is based on the power of shape, children will respond positively to silhouette illustrations. Other considerations, such as the relationship of figure to ground and the limitation of black and white, may influence children's responses.

Many research studies in the 1970's indicated that children prefer color illustrations to black and white, but often the pictures the children were examining were presented out of context, using some pictures from a book but not the picture book as a whole. It has been suggested that research carried out under laboratory conditions, with limited variables, and often taking pictures out of context, is grounded in "adult paradigms of how children operate" (Kiefer, 1982, p. 48).

Do children always prefer color illustrations to black and white illustrations? In Hurt's survey of preference studies (1991), he concluded that "As a general rule, the amount of realism displayed and the use of color are picture aspects that produce preferences common to all children" (p.169). His analysis of the studies was done to provide library media specialists with a guide for selecting picture books. One of his four considerations was "Use of Color," about which he stated, "All children prefer realistically colored pictures to black-and-white" (p.171). Following such a selection guideline would omit many wonderful books, from Tenniel's illustrations of *Alice in Wonderland*, to Shepard's *Winnie the Pooh*, to Macaulay's *Black and White*.

THE STUDY

It is our contention that children can appreciate black and white illustrations, particularly silhouettes, when they are properly introduced. Children can understand what is being represented when they are given the opportunity to examine the book and formulate their responses. To test this hypothesis, we designed our study to introduce some fifth grade children to the concepts of light and dark, shadows, and silhouettes, and then to share some picture books in which these techniques are used. We were interested in children's free responses to the silhouette illustration rather than posing questions or tasks which depended on selection. We didn't want to ask them to make either/or choices, such as choosing pictures with color or pictures in black and white.

To record and interpret children's responses to pictures, we adapted structures suggested by the writings on reader response of Hickman (1992), Stewig (1992), and Edwards (1991). Children were not asked directive questions but rather were engaged in discussions about what they felt about the pictures or what the artist was trying to say. They reflected on the pictures, on the artistic style, on whether the picture added anything to the story which the words did not tell. They connected to the pictures through their musings and conversations. As they did this, they were constructing their own meanings, a process which relies on the experiences they bring to the book.

Stewig (1992) suggests that children learn to read a picture much as they learn to read text. "They can be helped to examine the entire book as a context for meaning, the individual pictures, and parts of pictures, in a process parallel to reading comprehension" (p. 21). Further, they can be involved "in determining whether the artist is explaining, extending/ expanding, or adding to word text through visuals" (Stewig, pp. 21-22).

Our study was designed to encourage the fifth graders to explain and describe, to extend and expand, and to add to the picture books they examined. We provided opportunities for visual as well as oral response, and opportunities for children to express themselves in movement, motion, and drawing.

PICTURE BOOKS

Individual Response

Before we took our ideas to the fifth grade classrooms, we decided to present three books with silhouette illustrations to one seven-year-old child, Tricia. We hoped she would help us learn more about a child's perspective on silhouettes. Two of the books, *Cinderella* by Jan Pienkowski, and *In Shadowland* by Anno (a story which is told in two settings, a place with color and light and a place where shadows go in the winter), have illustrations using both silhouette images and color. *The Enchanted Caribou* by Elizabeth Cleaver uses only black and white illustrations in a story about a girl who is turned into a caribou and is transformed back into a girl by the one she loves.

One of the researchers worked with Tricia reading along with her and asking her questions when the opportune times arose. Tricia was already familiar with the concept of shadows, she said, but did not know the word "silhouette." When asked how shadows are made, she said, "They're people or anything and the sun... or you can outline something with your hands and put a flashlight on it."

Responses to Cinderella

Before reading the words in each story, Tricia was asked to look at the pictures page by page. She then described the story in her own words. Tricia had no trouble distinguishing the figures in *Cinderella*. She already knew the story and described the illustrations with the familiar storyline in mind. When looking at the first page of the story, she demonstrated her knowledge of folktale tradition and said, "They are saying like 'Once upon a time' or something like that." Tricia was able to distinguish the characters whom she knew so well. Cleaver suggests, "since there are usually no visual cues in its interior, the silhouette must capture the essential attributes of the person, object, or motion being pictured" (1991, p. 416). Tricia saw those attributes of the characters in *Cinderella* and knew the stepmother "because she has warts." She recognized Cinderella because she "looks delicate."

Cleaver also said, "Shape and the relationship of figure to ground provide a representation of reality which is interpreted and fitted into the viewer's own knowledge and experience" (1991, p. 415). Pienkowski's *Cinderella* apparently did not quite match Tricia's prior knowledge of *Cinderella*. When Tricia was describing what she saw in the silhouettes and was telling the story by looking only at the illustrations, she hesitated at the page of lizards. In Pienkowski's retelling of the tale, the lizards turn into footmen for the pumpkin coach. Tricia knew about the mice in *Cinderella*, but in her version (Disney's version), no lizards were in the story. She looked, paused briefly, and said, "This is nothing, just a bunch of lizards," and quickly went on to the next page.

Responses to The Enchanted Caribou

Tricia was able to describe fairly accurately the storyline of *The Enchanted Caribou* before reading the story, but was unsuccessful in using her past experience to place the story in its appropriate setting. When asked what she was thinking about or looking for when she was going through the book, Tricia said, "I was thinking there are not many things in these pictures, and they are black and white." She wanted more detail and "clouds." Tricia felt these pictures were too "plain." She needed more information to help her set the scene. The story setting, the Arctic, was not in her repertoire of stories or experiences. She had not developed a schema in which she could place *The Enchanted Caribou*.

Shared Responses

Responses to In Shadowland

In Shadowland was presented to both Tricia and the group of fifth graders chosen for this study. This book uses color and silhouette to represent two kingdoms. Colored illustrations and silhouette illustrations are juxtaposed on facing pages. Occasionally colored images are placed within a silhouette page.

Interestingly, Tricia and the fifth graders seemed to treat this story as a mystery, as if there was hidden information within the pictures. All of the children studied the pictures at length. They noticed the shadows and silhouettes on both the colored and the silhouette pages. All were intrigued by the details. Many of Tricia's comments were similar to the fifth graders' comments about the pictures.

The clue in one particular silhouette illustration, a watchtower, interested all the children. On the tower is a weathervane, a flag sporting an eye design, and other detailed objects in silhouette. Also on top of the tower a watchman is presented in color illustration. Tricia examined the illustration and said, "The eyes on the flag are the strangest thing." She did not know why the eyes were on the flag until she read the story and the word "watchman." She then excitedly explained the reason for the eyes. The sophisticated fifth graders, however, knew immediately, only from examining the picture, why the flag had eyes. At seven years old, Tricia had not had as much experience with symbolism as the fifth graders.

Both Tricia and the fifth graders felt that it took time to study the illustrations. When asked if it was easy to know what you were looking at, one fifth grader said, "No, because there's no depth. It's a problem because you can't use color to help." Tricia said, "In Shadowland [the silhouettes] are harder to tell because they are all attached together."

Still, *In Shadowland* was a popular book with both Tricia and the fifth graders. The children examined the pictures and explained what they saw. All children commented on the silhouettes where color is added. When reflecting on all the illustrations in the book, Tricia explained, "I like that the monkey turned red. The monkey stands out more." This comment referred to the silhouette page where a red silhouette of a monkey is presented on a full page of black silhouette images.

When asked how they liked the way the story was presented, one fifth grader said, "You can look at the pictures more to decide what's in the story." Another student concluded, "The story itself wasn't so hot, but it got interesting with the pictures."

This experience with picture books introduced these children to the art form of silhouette, encouraged them to think about what they saw in the picture books and challenged them to draw their own conclusions from what they already knew and from what they saw. As one fifth grader said, "There's a lot in these pictures."

As a culminating activity with the fifth graders, students made their own silhouettes representing a part of any story which they particularly liked. They could draw, using pen and ink, or they could tear or cut out shapes from black paper to create their own silhouette images. Some children chose to illustrate fairy tales (Figure 1), one chose an event from a chapter book (Figure 3), and another child cut and pasted his version of *Where's Spot?* by Eric Hill (Figure 2). Each child displayed his or her silhouette while the other children guessed what story was being represented. Again, the children were using their prior knowledge (of books) and the relationship of figure to ground to determine the intended story. Allowing the children to make a visual response to the silhouette illustrations they examined seemed to free their imagination and increase their understanding of this artistic technique.

DRAMATICS

Building Response Through "Process Drama" Activities

The main objective of this aspect of our research was to analyze children's responses when a dramatic context was used to view and actively respond to selected silhouette illustrations. How would the dramatic context and teacher's actions determine what they read in the illustrations? We planned to explore how the artist's message embedded in the illustration shaped the children's emerging dramatic story. Would the visuals they recreated explain what they saw? Would their verbal, written, and visual drama activities in response to the illustrations move them to expand/extend and create new meaning?

The lesson was conducted in an Arts Impact School which emphasizes the visual arts, process or educational drama, music and dance as important areas of study. In this school the arts are used as powerful vehicles to explore many areas of the curriculum. The activity was done in a fifth grade classroom and lasted almost two hours. The purpose of the activity was to analyze the factors that influenced the children's response to the silhouette illustrations used in the activity. The two illustrations the drama teacher used were by Arthur Rackham and appear in the book *The Sleeping Beauty* (Evans, 1920, pp. 34-35, 64-65).

Creating the Context

The drama teacher began the lesson by narrating that it was a time long ago. She then assumed the role of a medieval cloth merchant and told the children, whom she addressed as villagers, that she had just had a very strange encounter. She said, "I went to the castle to sell my beautiful cloth but the gates of the palace were locked. No one would let me inside." She then told the children that as she was leaving a mysterious figure appeared and handed her two strange pictures. She continued, "Let me show them to you."

At this point she presented the first Rackham illustration for the children to look at. It was a two-page silhouette from *The Sleeping Beauty* (1920) illustrating the moment the uninvited fairy curses the baby princess. The children did not know these illustrations were from this book and had to rely on their ability to read the illustration in order to make sense of what they saw.

When the drama teacher asked, "What do you see here? Tell me what you think," they seemed to be immediately drawn into a process of reading the picture to discover what it meant both on a descriptive as well as a narrative level. They made comments such as, "I think one of the villagers is giving the king and queen something." Another child said, "One of them is accusing someone." They mentioned various people in the illustrations as they speculated on the meaning of the picture. Some of the characters they identified were an accuser (evil fairy), a king, a queen, a joker (the page), and a child (the baby princess).

The teacher guided their reading of the illustrations by asking questions that encouraged the children to articulate the details that led to their visual conclusions. For example, after someone mentioned the king and queen she asked, "How can you tell it is even the king and queen? It is so baffling to me!"

When a student said, "It looks like someone has fainted on the queen's lap," the teacher mused that this was possible but that she wasn't sure, and held the picture out for the class to see. This motivated others in the group to look again more closely, and a girl said, "It's a child." Several students expressed agreement and some commented, "I see a hand," or "Maybe a villager is saying that it is her baby." One child, drawing on previous literature experiences, said, "Maybe it's like Rumpelstiltskin and the baby."

At this point the children were actively involved in creating their own narrative based on their reading of the illustration. They were motivated to look and figure out what this illustration meant, and at this point someone asked to see the second illustration. When the teacher showed them this picture the children leaned closer and their "ahs" and "oohs" were audible. It was as if this new picture both confirmed what they were thinking and opened up new dramatic possibilities.

They excitedly speculated on how these new visual images fit into the dramatic narrative they were creating. The images of various people in the castle all busily going about daily activities caused some to isolate details in the illustration and speculate on what these things might mean, such as the spinning wheel which once again some connected to the fairy tale *Rumpelstiltskin*.

Another child was drawn to the part of the whole picture that showed the king and queen and said, "I see the king and queen fighting." Others responded to the picture and story as a whole. One of these students speculated that all of the activity in the picture could mean that the king and queen had been robbed. Still another said, "It might be the day the baby will be married."

The drama teacher once again focused the students' attention and asked, "How can we find out for sure what is really going on?" At this point the dramatic context, illustrations, and role-play began to mesh. Through a series of drama activities the students would explain and respond to these ideas and images, expand/extend these images and create new ideas and images in order to create and respond to "their" story.

Explaining

In role as the villagers they decided to sneak into the castle and find out what was really going on. Using drama they were instructed to physically create what they thought was happening in the castle. Each child did this by first assuming the role of a person in the illustrations. Then the children divided into four groups and planned tableaux or still pictures. Most of the groups' tableaux reproduced what they had observed in the illustrations as if physically explaining what they had seen.

Three groups recreated the scene in the throne room from the first illustration. The characters they included were the king, queen, evil fairy, baby, page, and a person hiding behind the wall, all prominent characters in the illustration. The fourth group drew their scene from the second illustration and showed a tableau of the king and queen fighting.

While the groups were looking at the tableaux, the teacher invited the children to add their thoughts aloud as the characters. Once again their comments revealed how the images they had seen and were now recreating drew on fairy tale motifs. In the first group the accuser (the children's label for the finger pointing evil fairy) in reference to the story of *Rumpelstiltskin* said, "And at the age of sixteen she will be mine." Another student, also role-playing this character, said, "At the age of sixteen she will prick her finger on the spinning wheel and die forever. Ha! Ha! Ha!," actually referring to *Sleeping Beauty* , the tale the illustrations had been created for. The group which showed the king and queen fighting posed the question, "I wonder why the king treats her that way?"

Extending/ Expanding

Almost as if in response to the above dialogue the last group, which had also recreated the throne room scene, spoke thoughts that added new information to the story the children were creating. Two figures hiding behind the wall said, "Oh, my goodness, I can't believe the queen stole a baby."

The second phase of this activity helped the students expand on these ideas further. They were told that they would show their tableaux from behind a paper screen. When the teacher asked the students what they would see behind the screen they responded, "Shadows." She then invited them to expand on the ideas presented earlier by saying, "And the shadows might not be saying the same thing as the real people. It's up to you to decide what your shadow has to do with your real self."

The children enjoyed seeing their own reflections on the paper screen, and when a light projected the shadows it became even more obvious how they were mirroring the illustrations they had seen. The shadows they projected looked surprisingly like the silhouette illustrations. They continued to extend their narrative at this point adding more and more detail. Again they showed the influence of folk literature. One girl role-playing the queen repeated details from the Rumpelstiltskin story. She said, "You've stolen my bracelet, my necklace and my ring. You cannot have my baby."

Creating New Meaning

Throughout the drama, the children did a variety of activities in order to more fully develop their story as well as some of its more abstract and symbolic themes. One of these themes was the relationship between the shadow and the real person. In order to explore this the children role-played a shadow or a real person and in pairs interviewed each other to find out something they did not know before (for instance, the king's shadow talked with the real king). Some children added to the story while others produced more abstract responses such as, "I have a real mean side" and "I turn to my shadow for strength."

The last series of activities began when the students were asked to write, in role, from the perspective of someone in the story. Some chose to write as people outside the castle who were trying to figure out the mystery. Others wrote as real people in the castle while still others wrote as shadows. These writings revealed many levels of response which added new information to the emerging story. Two students wrote:

> I feel dark and gloomy,
>   like the wind's shadow.
> But I am my own shadow,
>   of daylight.

and

> It's dark, I'm afraid.
>   No light, I'm afraid.
> The truth not spoken.
>   No light, I'm afraid.
> I'm not understood by others.
>   I'm not understood by me.

These students not only expanded and extended ideas explored in the drama activities but drew on and expanded the theme of light and dark which was a core visual element in the silhouette illustrations.

Reflecting on the Drama

When the drama was over the teacher asked the students what they felt the theme of their story was. Many said it was about the baby. Other responses included greed, jealousy, and revenge. One boy said, "Well I think it was mostly about how people let out their innermost feeling and inner ways of dealing with wickedness." Each of the children had taken their own meaning from the story. They were making sense of it by using their previous knowledge and experiences, e.g., fairy tales as well as their drama activities. Their responses had explained the illustrations, e.g., "It's a queen, I see the crown." They had extended/expanded the illustrations and story, e.g., "You've stolen my bracelet, my necklace and my ring. You cannot have my baby." Finally, they created new meaning both visually through tableaux and narratively through oral language and writing, e.g., "I turn to my shadow for strength."

Conclusion

In this research the children's response to illustration using drama was a complex and interconnected process combining the illustrations and the dramatic medium. Let's look first to the art itself, which began with Rackham's skill to communicate images and relationships as well as focus the visual attention of the viewer. For example, the central focus of the first picture which shows the evil fairy pointing at the baby also became the central focus of the drama. It was intensified by the medium of the silhouette itself with its sharp contrast of the black and white and emphasis on shape. These distinctive features captured the children's attention. It is not surprising then that the characters the illustrator focused on or highlighted were the same characters the children chose to act out their drama.

The lack of details in the silhouettes gave the children ample room to extend/expand by drawing on details from their own personal experience and literature backgrounds. One student commented that he liked the silhouette illustrations because, "These make you think more. It's like the shadow. The black and white are more mysterious." For some, then, the lack of details aided rather than limited their response. In addition, as discussed earlier, the silhouette also functioned symbolically, highlighting the main themes of good vs. evil and light vs. dark.

The second factor that influenced the children's response was the dramatic medium itself. Four areas of this medium were most relevant in this research:

- First, the initial dramatic context. The key question, "What is going on in the castle and what do these pictures mean?" motivated the children to look carefully and with purpose at the illustrations presented.
- Second, the nature of the dramatic medium to combine and reflect on visual as well as language modes of communication.
- Third, the teacher's actions throughout the drama which supported and extended the children's response. Throughout the drama the teacher worked to focus their attention, asked questions that called for response, and structured activities that pushed their response to deeper levels.
- Fourth, the social nature of the medium. Drama is a group activity, consequently, the children were influenced by each other's ideas as they responded in the drama. Narratives were built on narratives and visual interpretations influenced other visual responses. The response through drama became a form of visual and oral storytelling, a continuous and interconnected process.

The observations made in this classroom by one of the researchers led to the speculation that silhouette illustration can be a powerful visual stimulus to creative thinking and rich response. When children are motivated to actively respond to illustrations in this way they develop important visual and conventional literacy skills. They use both visuals and language to create story. This story, according to Barton and Booth (1990), "is a continuous process. We borrow from others to see how our story fits theirs, then we remold it, add to it, alter it, tell it anew, always exploring fresh possibilities" (p. 14).

FINAL ANALYSIS

Of course, studies as limited as the two we conducted cannot hope to explain all there is to know about children's response to silhouette illustration. However, both studies noted several recurring patterns concerning children's response. We found that children:

- focused on visual details that were familiar and had personal significance;
- drew on context clues to cue visual response;
- used past literature experiences and knowledge to extend the narrative of the visual;
- used experiences in the classroom and group interaction to shape their own response.

In conclusion, silhouette illustrations present learners with many challenges as the learners make meaning, by drawing on numerous personal and group constructs. This process can be supported in a school setting in several ways. First, by giving children a variety of opportunities to view and muse over silhouette illustrations; second, by supporting their reading of these visuals through teacher actions such as questioning, focusing of their attention, and structuring learning activities.

Finally, an often overlooked factor is to appreciate as teachers the theory that children may benefit from learning experiences that contain elements of ambiguity. In our research one student commented, "Colored pictures really tell the story." Thus the benefit of silhouette illustration may be the challenge silhouettes present viewers as they are called upon to fill in the missing details in the illustrations from their own experiences and emerging understanding and to create and recreate stories of their own.

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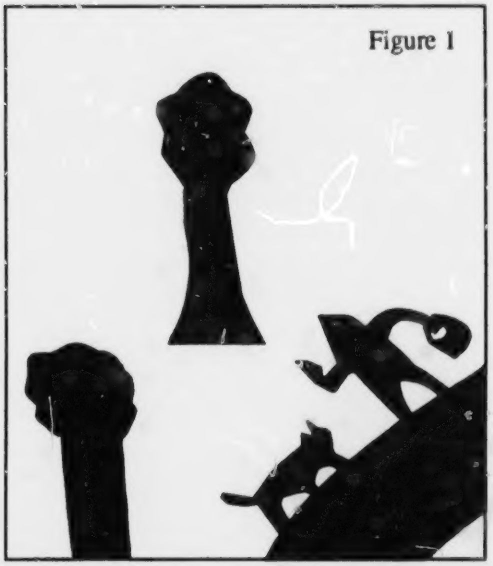


Figure 1

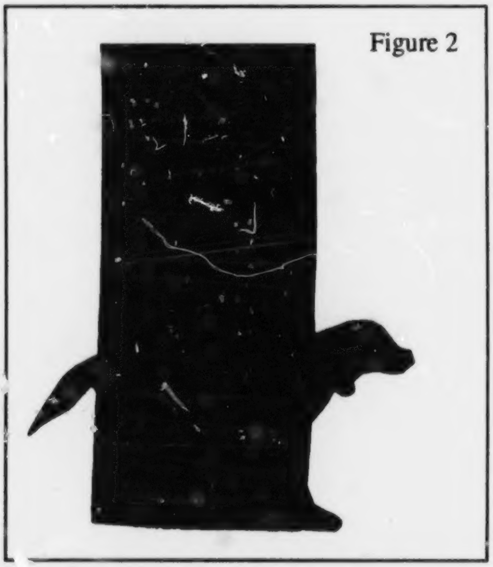


Figure 2

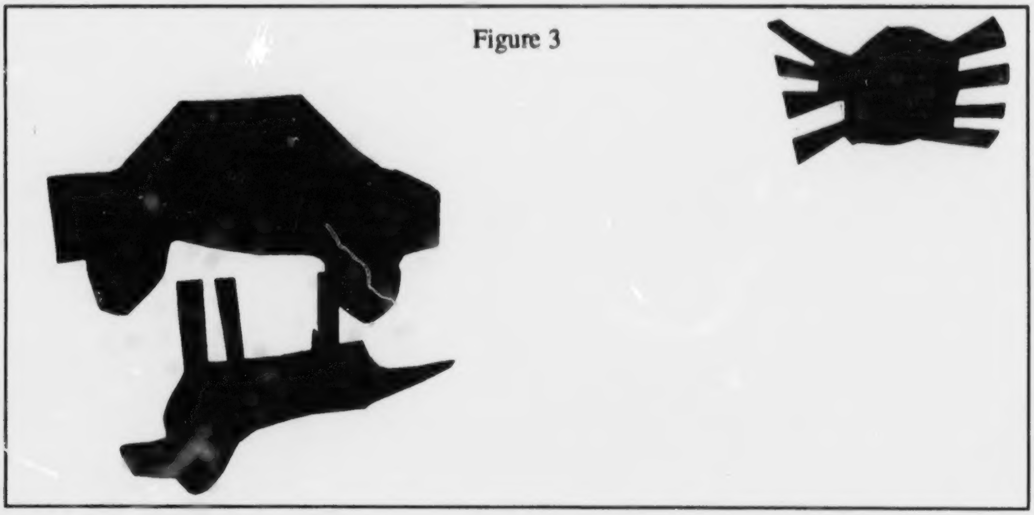


Figure 3

Representation of Culture in Children's Picture Books

Anne Drolett Creany
Richard A. Couch
Edward J. Caropreso

America is a country that is blessed with rich cultural diversity. This diversity is not a recent phenomenon. In addition to native people, this nation was shaped by individuals from all corners of the globe whether they traveled here out of hope, desperation or coercion. At one time, newcomers to this country sought to shed evidence of their cultural heritage and blend in with mainstream America. However, in contemporary society, residents of the United States are proud of their ethnic heritage and strive to preserve its values and unique characteristics.

Classrooms mirror the diversity of American society. School children need the opportunity to explore the heritage and values of the various cultures and peoples who placed their stamp on this country and who continue to contribute to its rich ethnic diversity.

Children's literature can be used to explore and develop appreciation for cultural differences (Rasinski and Padak, 1990). Norton (1990) observes that in addition to providing enjoyument, multicultural literature benefits children in the following ways: children from an ethnic minority group can identify with and feel proud of their heritage thus boosting self-esteem; and children can recognize the commonalities shared by all ethnic groups--needs, emotions, dreams, fears. Rudman (1988) concurs, contending that ethnic groups need to see themselves reflected in literature. Their portrayal should be well-developed and offer a multi-faceted view of their heritage. According to Rudman, individuals who develop an appreciation for their own diversity are more likely to value others.

This paper will discuss the role of illustration in children's picture books. It will also examine the portrayal of minority cultures in picture book illustrations with respect to stereotypes, cultural values, and motifs. Criteria for evaluating multicultural literature will be considered.

Role of Illustration in Picture Books

By definition, the picture story book is a picture book in which words and illustrations have equal responsibility for telling the story (Lynch-Brown, 1993). According to Huck (1993) "a picture storybook . . . must be a seamless whole conveying meaning in both art and text" (p. 24). Schwarcz (1990) concurs and describes the picture book as "an irresistable medium" (p. 5). He observes that illustration and text work together intimately to communicate the picture book's message. The two media intertwine, complementing and extending each other in such a fashion that readers cannot understand the storyline by attending only to the text or only to the illustrations.

Illustrations in picture books sometimes simply mirror the text. At other times, pictures extend text through development of character, setting and mood. For example, in *The Rough-Face Girl*, an Algonquin Cinderella tale, the text describes the derision heaped upon the girl clad in strange clothes. It is the illustration that reveals her dignity and courage as she walked to the wigwam of the Invisible Being. In many picture books the use of metaphor and symbolism invite the reader's response. The open-ended nature of such books invites repeated exploration and varying interpretations. The initial perusal of *Lon Po Po* (Young, 1990) reveals a Red Riding Hood variant from China. Subsequent viewings show the wolf's image as part of each illustration.

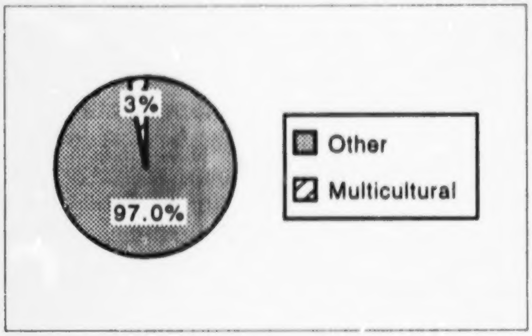
Nodelman (1992) also notes the interactive nature of text and illustration. However, Nodelman focuses upon the unique contributions of each medium. He observes that pictures are able to convey some aspects of a story more effectively than text. Illustrations can describe the characters or settings of a story with a complexity that cannot be achieved with text that is written for a young, inexpert reader. Text, on the other hand, is more effective than illustration in conveying temporal order, cause and effect, and super or subordinate order. For example, an author can state that "things went on in the same manner, day after day" more easily than an artist could draw such a concept.

In addition to the integrative, yet distinct, characteristics of words and images, Schwarcz (1990) points out that picture books are a serial art form. One illustration leads to the next one. They are interpreted holistically. This serial nature and the integration of image and word suggests a parallel between television, movies and picture books. Like television and movies, picture books also have the potential to influence a child's view of other cultures.

Portrayal of Culture in Picture Books

The number of children's books which reflect the minority experience or are written/illustrated by minority authors is quite small.

Sims (1992) estimates that in the 1990's 2% of the books published annually will reflect the African American experience. Other minority cultures are even less well represented.



Under-representation of minority cultures in picture books results in two negative consequences. First, minority children are less likely to see their own image reflected in books. Such an absence could suggest to a child that s/he is not important enough to appear in books. Second, majority children may receive a distorted view of what the world is really like. As Larrick states, "Although his light skin makes him one of the world's minorities, the white child learns from his books that he is the kingfish" (p. 63).

In addition to the scarcity of books about minority cultures, the portrayal of another culture through illustrations is sometimes innaccurate, watered-down or even stereotypical.

Stereotypes are most evident in illustrations found in older books. *Little Black Sambo* (Bannerman, 1899) with its exaggerated facial features is an obvious example. Another example is *The Matchlock Gun* (Edmonds, 1941) which portrays American Indians as tomahawk-wielding savages preying on innocent settlers. Wise's illustrations for *The Five Chinese Brothers* (Bishop, 1938), a humorous folktale, portrays brothers with distinct yellow skin, wearing coolie hats and each with a long cue hanging down his back.

Contemporary books are not free of misrepresentations, however. *Alligators All Around* (Sendak, 1962) is an alphabet book which shows alligators "imitating Indians" for the letter "I." The imitation includes feather headresses and tomahawks. Mayer's illustrations for *Everyone Knows what a Dragon Looks Like* (Williams, 1976) provide a Chinese setting but the protagonists are a caucasion child and a chubby Buddha.

Aside from stereotypes, misrepresentations continue to occur. This tendency is quite obvious in literature about American Indians. Susan Jeffers' highly acclaimed *Brother Eagle, Sister Sky* (1990) depicts Seattle, a Suquamish chief from the Northwest, wearing regalia of the Lakota people, a tribe of the Great Plains. In Lynne Cherry's book, *A River Ran Wild* (1992), Native American children are painted wearing feathers, an inaccurate portrayal. In both books, Native Americans are pictured as ghostly spirit-beings. This tacit implication that Native Americans belong to the past is offensive, according to Naomi Caldwell Wood, President of the Native American Library Association. Wood states that such ghostly portrayals imply that Native American culture is a quaint relic of the past, rather than a vital, contemporary culture.

Cultural Values in Picture Books

The values of a culture are usually evident in its folklore. In European folktales justice prevails, virtue triumphs over wickedness and characters live happily ever after as is evident in *Cinderella* or *Snow White.*

In Native American literature, placing the good of the people before personal gain is evident in *The Legend of the Bluebonnet* (dePaola, 1983). *The Story of Jumping Mouse* (Steptoe, 1984) shows the importance attached to pursuing a personal vision as does *The Legend of the Indian Paintbrush* (dePaola, 1988). The Native American folktales retold and illustrated by Goble reflect the Plains Indians belief in the interrelatedness of nature and respect for all living creatures. Goble's research into the symbols and motifs significant to Plains Indians is evident in his detailed illustrations.

Steptoe's illustrations for *Mufaro's Beautiful Daughters* (1987) show the attractiveness and physical diversity of the characters in this African folktale. They also affirm traditional African values of hospitality and respect for elders. In this story kindness is rewarded and greed is punished. The Dillon's illustrations for *Ashanti to Zulu* (Musgrove, 1976) also reveal beauty and diversity in twenty-six different African tribes and their customs.

Taro Yashima's soft watercolor illustrations in *Crow Boy* (1955) do not focus on the individual features of characters but authentically create the atmosphere of a rural Japanese village. In this story a wise teacher respects the unique talents of Chibi and leads the villagers to respect him, too. The values of respect and loyalty are also highlighted in *The Tale of the Mandarin Ducks* (Paterson, 1990), a tale of two servants who are punished for releasing a captive duck to be with its mate. The ducks repay the servants for their kindness.

Ed Young's watercolor illustrations for *Yeh Shen* (Louie, 1982) will help children recognize the universality of human problems. Yeh Shen has the same problems and longings as her European counterpart, Cinderella. But Yeh Shen's wishes are granted by a carp, a symbol of good fortune, rather than a good fairy. Her slipper is tiny, reflecting a traditional concept of beauty in China. Young's painted screen design contributes to the mood of *Yeh Shen* and also appear in his watercolor and pastel drawings for *Lon Po Po*, a Red Riding Hood story from China. The engaging sisters he introduces in *Lon Po Po* are more clever than the European Red Riding Hood and kill the wolf themselves by appealing to his greed for gingko nuts.

Folktakes are important repositories of cultural values but if children are only exposed to folklore, they may not recognize the contemporary features of another culture. *Our Home is the Sea* (Levinson, 1988) depicts a Chinese boy who loves his life on a boat in the river. The illustrations present a dignified picture of a way of life that is not accessible to most American children. In this way, the artist opens a window on the world for children.

The drawings in *Abuela* (Dorros, 1991) complement the warmth between grandmother and granddaughter as they fly above New York City. The grandmother's Spanish phrases add to the cultural beauty of this light fantasy. In this book, Hispanic Americans are not portrayed as impoverished, a frequent stereotypical portrayal.

Children will gain respect for the courage of modern-day pilgrims who risk everything to come to this country when they read *How Many Days to America*, (Bunting, 1988) the story of a family who rides from Cuba to Americain a small boat.

Whether folktale or fiction, multicultural literature has immeasureable value for children of all cultures. The reflection of the culture's images should be evaluated for accuracy and presence of stereotypes.

Criteria for Evaluating Multicultural Literature

Regardless of the culture of the liteature under study, certain criteria should be used in evaluating multicultural children's literature. Norton (1991) based her criteria for evaluation onthe recommendations of the Children's Literature Review Board and the Council on Interracial Books for Children. Among the criteria listed by Norton are several which apply to visual images:

1. Are members of a minority culture shown as individuals characters rather than representatives of a racial or ethnic group?

2. Does the artist avoid glamourizing minority characters?

3. Are members of a minority portrayed as physically diverse individuals or does everyone look alike?

4. Is a culture accurately and respectfully portrayed?

5. Is the setting accurate? Are members of a minority shown in one type of setting?

If an evaluation reveals flaws in a book, parents and teachers should point them out to children. Helping children to recognize stereotypes is preferable to banning or destroying less desirable books. Close inspection of books will promote children's critical thinking skills. While comparing multicultural books which accurately reflect cultures with books which do not, parents can model their own appreciation for respectful portrayals of other cultures.

Conclusion

Children who will come of age in the twenty-first century need to see their reflections in the mirror provided by children's book illustrations. They need a validation of their own background and values. They also will benefit from a glimpse through the window provided by children's books into the lives of people from another culture. The artist's images in multicultural literature give children the opportunity to see the similarity among peoples and also to appreciate the differences.

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Changing Images of Alice

Betty P. Cleaver
Barbara Erdman

Alice in Wonderland is one of the supreme fantasies in English literature and is, today, something of a cultural icon. We know what it means for someone to speak of "grinning like a Cheshire cat." Not too long ago a newspaper quoted a Congressman who remarked of the political labyrinth of Washington, "It gets curiouser and curiouser!" The language and images of Alice have now entered our collective consciousness.

This tale started out rather modestly as a story told by an Oxford don to amuse the three Liddell sisters, daughters of Dan Liddell of Christ Church, on July 4th, 1862. Charles Lutwidge Dodgson wrote in his diary, "I made an expedition up the river to Godstow with the three Liddells; we had tea on the bank there, and did not reach Christ Church again till half past eight" (Davis, 1972, p.8). At the request of the girls for a story, Dodgson invented the tale during the day-long outing. The children, entranced with the story, begged him to write it down. This he did and by January 1863 he had finished a manuscript which he illustrated with his own sketches; he gave this to the Liddells. Friends of the Liddells saw the manuscript and urged Dodgson to publish it; he spent the next eighteen months rewriting and polishing. Since he was indeed a serious mathematics professor, he chose to use a pseudonym for authoring *Alice in Wonderland*. In choosing a pseudonym he "latinised his Charles and transmogrified his Lutwidge" and "was destined at last to be known and beloved, all the world over by his pen-name Lewis Carroll" (De la Mare, 1930, p.58).

At the suggestion of editors at Macmillan (publishers to Oxford University), Dodgson gave up the idea of using his own drawings and asked John Tenniel, an artist/cartoonist at Punch, to illustrate the story. After some negotiation, Tenniel agreed. Dodgson sent him a photograph, not of seven year old Alice Liddell, but of another little friend, Mary Hilton Badcock, to serve as a model for the fictional Alice. The communication between author and illustrator was outwardly courteous but Tenniel found Dodgson to be irritating and relentless in proposing his ideas (Davis, 1972). Tenniel did not use live models but seems to have worked from the photograph of Mary Badcock, and he based many of his drawings on the original but less artistically competent ones drawn by Dodgson in his first version of the book (Barr, 1986). Perhaps because of this, Tenniel's drawings have been criticized for a certain wooden quality. "He treats Alice as a lifelike wax doll and the other characters as though they were ingenious clockwork models, probably German in origin" (Feaver, 1977, p. 15). On the other hand Tenniel took Alice seriously. "Where later illustrators snigger and exaggerate, make everything absurd and grotesque, where even Carroll in his original sketches tended to caricature, Tenniel takes the story at face value.... They are serious illustrations of funny situations; just as in dreams, though we may be doing the most absurd things, we keep our everyday appearance" (Smith, 1948, p. 23) . In retrospect, the choice of Tenniel was an inspired one. "The world has never seen a matching of work with drawing to equal the Carroll/Tenniel collaboration," said one of Carroll's biographers (Pudney, 1976, p.75). Tenniel's drawings have become the standard by which all other illustrations of *Alice* are judged. Ironically, *Alice in Wonderland* brought Dodgson more fame and recognition than all his mathematical treatises.

In 1907 the British copyright expired and eight new editions, with new illustrations, appeared that year (Barr, 1986). Since then well over a hundred artists including the surrealist Salvadore Dali have illustrated *Alice*. In fact, in the last ten years, more than fifteen new editions have appeared, including a pop-up-book and a version with illustrations by Tony Ross that are reminiscent of Gahan Wilson.

Some illustrators of Alice have been more faithful to Tenniel's interpretation while others have provided very original approaches. Through their drawings illustrators have provided varying experiences for the reader of *Alice in Wonderland*. A brief review of a century of Alices presents a group of girls, often more different than similar, culminating in a very contemporary-looking Alice in 1993. Through the artistic skill of the illustrator, each Alice presents a unique personality. Although the text of the story changes very little between publications (in fact most adhere to Carroll's original text exactly), some artists illustrate events that others ignore and therefore provide a different emphasis within the narrative. It seems most obvious to say that illustrations of Alice in most cases merely reflect the artistic style of the times in which they were drawn. However a careful analyis of the publications reveals that through the artistic interpretation of her illustrators the character of Alice changes over time. Her illustrators present a variety of individual personalities that may indicate changing cultural images of girls and young womanhood, among other things.

THE STUDY

Our primary concern was to determine if the character of Alice had changed historically through the interpretation of different illustrators and to determine what the changes were and what impact they might have on the interpretation of the story. This paper reports the results of an analysis of eighteen different illustrators' versions of *Alice in Wonderland*, and, in a few cases, of *Through the Looking Glass*, published between 1865 and 1993. Many more editions of the book were produced during that period, but we felt it was important to study only complete works that were available to us. Reproductions of single illustrations from an additional number of works were also available through other sources, but we chose not to include these illustrators in our study. Artists illustrate narratives with a concern to the unity of the work and each single illustration comprises part of the whole. To study a single illustration without reference to the others is to remove it from its context. Our analysis therefore is only of those illustrators whose entire work we could obtain. We will, however, refer occasionally to information reported by others in secondary sources.

For our analysis we used a formalist methodology adapted from the work of Bordwell and Thompson (1986). While their work relates more specifically to film art, they describe a formalist methodogy that can be adapted for all media that use aesthetic form. Space does not allow us to describe their method, or our adaption of it, in any detail here. For further understanding we recommend reading their entire work and the work of others (e.g. Erdman, 1988). Within our analysis we considered Lewis Carroll's narrative of *Alice in Wonderland* as the formal system underlying each illustrator's work. Within each illustrator's version of *Alice* however, the text of the story interacts with the artist's unique illustrations to create a specific stylistic system. Each illustrator provides his or her own unique experience for the reader of *Alice in Wonderland.*

RESULTS

Our analysis included work of 18 different illustrators of Alice. Unfortunately, space here does not allow us to include detailed descriptions of the work of each. Instead, we will discuss the works that we feel are most significant to the interpretation of our results and will refer more briefly to others when needed.

John Tenniel originally created 42 black-and-white line drawings for Lewis Carroll's story. The illustrations were small and were designed to be placed within the text. Later, after the book became popular, he added fifteen full page illustrations which were included as colored plates tipped into the book. Those familiar with *Alice* will remember that it is a story of a little girl's whirlwind trip through a series of fantastic places and interactions with a series of bizarre, humorous characters. She falls, climbs, crawls, swims and runs through Wonderland. Carroll describes a brave child with a kind heart and considerable intelligence. She takes a deliberate and active role in the events that happen—often saving herself and sometimes rescuing others in the story—by her wits and ingenuity. Tenniel's careful line drawings certainly do not capture the complexities of Carroll's generous and heroic Alice. He illustrates her simply as a stubborn and sturdy girl. She is shown with a wasp waist, large piercing eyes and Medusa-like hair flowing from an overly large head. She is most often seen in a stiff, determined pose with an expression of dismay.

Our analysis of the plot indicates that Carroll describes at least 67 different events in the story. In reading the story one is aware of how many events vividly described by Carroll were not illustrated by Tenniel. Many delightful and vividly described images were not selected. For example, at the end of Chapter Six, Alice finds the March Hare's house, where she soon comes upon the teaparty in the yard. Carroll described the event in this way: "She had not gone much farther before she came in sight of the house of the March Hare: she thought it must be the right house, because the chimneys were shaped like ears and the roof was thatched with fur" (Carroll, 1992, p.94). This image did not find its way into Tenniel's or, surprisingly, anyone else's subsequent illustrations of the story.

After Tenniel

In 1907 eight new editions of *Alice's Adventures in Wonderland* appeared (Barr, 1986). Two of these, one illustrated by Charles Rackham and the other by Bessie Gutmann, presented an image of Alice that was very different from Tenniel's. Arthur Rackham illustrated Alice as a slender, delicate featured, demure twelve year old with long dark blonde hair and a wistful, sad expression. She wears a white dress with large pink flowers and long black stockings. Rackham worked from a model for his illustrations (Gardener, 1960) and his Alice looks like a real girl. His work, however, strongly reflects the pre-Raphaelite and Art Deco tradition so prevalent in the early 1900's. In many of the illustrations the flowing lines of Alice's dress and hair become graceful graphic organic design elements.

A furor greeted Rackham's edition of Alice in 1907 including a cartoon and hostile remarks in Punch: "If... it were desirable or necessary to redraw Sir John Tenniel's unsurpassable and immortal illustrations to *Alice in Wonderland*, Mr. Rackham may be said to have performed the task as well as probably any draughtsman could for he is an artist with a rare sense of grotesque fancy and humour and an extraordinarily delicate and sensitive line. But it were better, we think, for him to employ his imagination upon his own rather than other men's business...." (quoted by Hamilton, 1990, p. 86).

No such criticism of Bessie Gutmann was recorded, certainly none that has survived to today, perhaps because her work is less imaginative and because she was a less well known artist. Cutmann's Alice is very different from both Tenniel's and Rackham's. She is a babyish, chubby brunette about 4 or 5 years old, with a rosebud mouth and large brown eyes. She wears a white dress, long white stockings and a blue hair ribbon and looks like a sweet, sturdy, unflappable toddler with little expression, except occasionally a look of wonder. To depict Wonderland, Gutmann mostly provided illustrations of realistically rendered animals—looking often like oversized benevolent nursery pets wearing clothes.

Continuing Interpretations

In spite of the wrath of a segment of the reading public in 1907 toward Rackham, artists continued to provide their own interpretation of the Carroll story. In 1914, A. E. Jackson portrayed Alice as a blonde 10 or 11 year old and, like Rackham, in a pink and white dress. However, compared to Rackham and Gutmann, Jackson's Alice is depicted in a variety of energetic poses with a full range of expressions including questioning and astonishment. With short white ankle socks and her hair secured in a long braid, she is often shown in expressive gestures with her arms and legs held away from her body—certainly gestures not allowed for the proper Victorian girl of earlier artists. She is shown fully interacting with events in the story, stretching on tiptoe or crouching on the ground as a physically active, athletic girl, perhaps a precursor of girl adventurers such as Nancy Drew and Trixie Belden, and certainly of later Alices.

Gwynned Hudson, in 1922, portrayed Alice as a fair blonde beauty, about nine years old, with waist-length straight hair held back with a black headband. Her bee-stung lips and oval face are reminiscent of the flapper fashion of the period. She wears a short white layered dress with puffed sleeves and a ruffled pinafore. With the addition of a red bead necklace, her outfit seems more appropriate for a middle-class children's party than an adventure. She assumes restrained or coy girlish poses and most often is seen either merely rising to her tiptoes or bending from the waist. In Hudson's work the character of Alice is often secondary to richly colored design or black-and-white graphic elements and other characters in the story often receive major emphasis in the illustrations.

David Hall's illustrations of *Alice in Wonderland* were made at the Walt Disney studio in 1939 during the preliminary stages of planning an animated film of the story. The film was not produced at that time and Hall's work was not used when the film finally went into production in 1948. His illustrations were discovered in 1976 and published in 1986 with Lewis Carroll's text as a new edition of *Alice's Adventures in Wonderland* (Carroll, 1986). Hall's is certainly the visually richest and most lively interpretation of the story we encountered, and in spite of being drawn 54 years ago, looks surprisingly contemporary. In an Afterword in the 1986 edition, Brian Sibley reports that, according to the Disney staff, Hall's illustrations were the result of a collaborative effort of Disney's staff to produce an interpretation of the story that would "get the spirit of the book to the screen... rather than merely reproducing the appearance of the characters...." as others had done before (Carroll, 1986, p. 147). Hall's illustrations for the story include many vivid watercolors and magnificently rendered drawings of a large number of events from the story—many more than Tenniel provided, and in some instances beyond what Carroll had described. Hall's interpretation of Alice is disappointingly impersonal, however. She is drawn almost as a caricature, with the wide vacant eyes and spindly arms and legs of a doll, with little personality or character. It is the incredibly energetic renderings of the settings, fantasy characters, and events in the story that are most remarkable about Hall's work.

The image of Alice that many remember most clearly is the one from the Walt Disney film. Work was renewed on the film in 1948 and it was released in 1951. Artists at the Disney studios collaborated to create a character which included little of Hall's work except Alice's blue dress. The Disney film version of *Alice* was based on both *Alice in Wonderland* and *Through the Looking Glass*, but included many characters and events not in either of the Lewis Carroll stories (Carroll, 1986). The Disney studio interpreted Alice as a blandly pretty girl with a great mass of neatly coiffed very blonde hair. She is characterized as a modest, almost prissy girl. Her perfect blue skirt will never fly up to reveal too much of her petticoats and those perfect knees will never become scuffed. The perfect, almost candy coated, little girl captured few hearts or imaginations; the film was one of Disney's least popular.

Personal Interpretations

While most illustrators interpret the story of Alice with considerable regard for the Carroll/Tenniel work, for some contemporary artists the story of Alice has inspired a very personal interpretation. Leonard Weisgard's 1949 work has the overlapping images of collage with flat pastel colors and soft edges to create illustrations that have a sunny, floating, dream-like quality. Weisgard's work makes little attempt at providing narrative accuracy, combining images from various places in the story in each illustration. Weisgard's Alice is characterized simply as a stylistically rendered, yellow-haired dreamy child with an unchanging flat expression. Her image is used most often as merely one of many design elements in the colorful, decorative illustrations

Ralph Steadman acknowledges that he was "obsessed... with images of the Alice story for years" (Carroll, 1973, endpaper). He interpreted Alice in 1972 in a series of bold black-and-white illustrations, with visual references to Japanese woodblock illustrations, Surrealism and contemporary culture. Steadman's Alice appears to wear a Japanese kabuki mask. The major design elements in his drawings are the prominent lines of Alice's flowing Japanese-style hair.

Although John Bradley's 1992 version of *Alice's Adventures in Wonderland* adheres closely to Carroll's text, Bradley illustrates the story with a series of drawings that are rich with political and social satire. For example, the card soldiers wear Prussian uniforms and helmets, the figures painting roses look like British working class laborers, the Mad Hatter resembles the movie actor Jack Nicholson, and the card pack in the last scene of the story is led by a figure who looks like Fidel Castro. In Bradley's work, Alice is a slender, self conscious, simple, blue-eyed adolescent. She looks like a contemporary young woman incongruously dressed in a childish white pinafore. She watches with wide-eyed surprise at the events she is witnessing.

In a very recent edition of Alice, Tony Ross illustrates *Through the Looking Glass* through a series of charming drawings that are reminescent at times, of the New Yorker illustrators of dark humor, Gahan Wilson and George Booth. Ross's 1993 Alice has the dark hair, striped stockings, and blue sailor dress of Ludwig Bemelmans' character Madeleine in the, now classic, children's stories. Like Madeleine, Ross's Alice is spunky and energetic, but Ross's drawings alway retain a humorous, slightly sinister quality.

Multicultural Influences

In 1992 two versions of *Alice in Wonderland* were published in which the main character is a girl of color. Donna Leslie illustrated Nancy Sheppard's adaptation of *Alice*. Sheppard retells the story in the language of the Pitjantjatjara people of southwestern Australia. An English translation is also provided. Titled *Alitji in Dreamland*, the story is faithful to the spirit and events of Carroll's story, but incorporates the Australian landscape, animals, plants, and Aboriginal culture. In the Sheppard story, the caterpillar becomes the Witchety Grub, and the dormouse a koala. Donna Leslie, a professionally trained artist, belongs to the Gamileroi peoples of Australia. She illustrates the story with a series of richly patterned drawings in the native style. She portrays Alitji as a naked Aboriginal girl who worries that being caught in Dreamland will prevent her from growing up and becoming a woman (Sheppard, 1992).

Whoopi Goldberg's *Alice*, illustrated by John Rocco, is a story of an African-American girl who leaves her familiar New Jersey neighborhood and goes into the fantastic land of New York in search of fortune. Goldberg's story is shorter and much less complex than Carroll's. While the book has some references to Carroll's *Alice*, both in the story and in the colorful illustrations, it is more simply the story of an adventurous girl who, after witnessing the dangers of the corrupt, adult world, learns to cherish what she has at home.

A Modern Girl

A significant trend within the last ten years is to show Alice as a more realistic and complex girl, as an increasing number of contemporary artists present Alice in the image of real little girls. Michelle Wiggins, Michael Hague, Justin Todd, Anthony Browne, and Peter Weevers present Alices who most certainly have been modelled after real girls. Michael Hague's work is a series of beautifully rendered portraits of a real child and Peter Weevers readily acknowledges that he used his daughter, Tilia, as his model.

In these editions the artists have retained, sometimes verbatim, the text of Carroll's Victorian story and, remarkably, each also chooses for his or her own illustrations the same events as Tenniel. In each edition, one can find Alice swimming in the pool of tears, Alice's huge hand reaching through the window of the White Rabbit's house, Alice holding the flamingo croquet mallet, and Alice sitting on the beach between the Gryphon and the Mock Turtle. However, these artists illustrate Alice and her surroundings with much more detail, and with more realistic and sophisticated illustrations than are found in any earlier editions. This may be due in part to a recent increasing interest in realism in art, but certainly is due also to changing social attitudes about girls.

When Alice becomes a real girl her character becomes more human, and her story therefore, becomes more complex. These illustrators of Alice reveal the affection and respect that they have for the girls they portray. In every edition, Alice is shown as an energetic, athletic child who fearlessly interacts with the many characters in a colorful and complex interpretation of Wonderland. Unlike the Alice of earlier illustrators, she is not overwhelmed by her circumstances. In most editions she has a very realistically rendered, expressive face that shows subtle emotions, such as questioning, disgruntlement, determination and pleasure. She often makes direct and unselfconsious eye contact with the reader. In these works Alice becomes an epic heroine through the real personalities of the girls who play her role. Contemporary illustrators of Alice, in fact, portray her more in keeping with the Carroll description of her personality than did Tenniel.

Thwaites(1963) suggested that the Alice story achieves its perfect balance and certainty through the character of Alice herself. She "never changes in her nature however large or small she may grow.... Sensible, good-natured, charmingly gentle and lovable, she personifies the best traits of Victorian childhood" (p. 116). Thwaites neglected to add that Alice is also brave, generous, and heroic. Tenniel did not adequately portray these characteristics of Alice. Perhaps the visual language of the Victorian times did not have the means to adequately describe the phenomenon of Alice as an active girl who determined her circumstances. Or perhaps Tenniel did not have the imagination or skill to create the illustrations that would do so. Or, perhaps more likely, Tenniel did not have the desire, or authorization to go very far beyond Dodgson's first awkward illustrations of the story.

CONCLUSION

More than a century of illustrators have presented their changing images of

Alice, the girl who takes a whirlwind trip through a fantasy place called Wonderland. Although each edition has changed the look of the original, our analysis of this work indicates that, although the character of Alice has been presented differently, ranging from a Victorian good girl image to the contemporary heroine of the last ten years of illustrators, much in fact has not changed from the first version *Alice's Adventures in Wonderland.* With the exception of the multicultural versions by Sheppard and Goldberg, Alice always wears a short dress with a pinafore or wide sash. Even very contemporary illustrators who show her as a complex and active girl dress her in an outfit which is more appropriate for a party than an outdoor adventure.

While the character of Alice has been interpreted differently, much of the setting of Tenniel's illustrations remains, even with very contemporary artists. In 1982, Darton noted that no new illustrators have "invented a new Gryphon, or a new Mock Turtle, White Rabbit, March Hare, Hatter, Caterpillar, Cheshire Cat, Red queen, White Knight. These are essentially, and must always remain so, the creation of the first artist and of the author whose fantasy provided the vivid details. A twentieth-century heroine merely accentuates that fact (Darton, 1982, p.258). This fact remains true eleven years later, as well. The events later artists choose to illustrate are the same ones that Tenniel illustrated.

The furor which greeted Rackham's illustrations in 1907 probably reflected the fact that in just forty years Tenniel's interpretation of *Alice* had become an archetypal image. The Carroll/Tenniel collaboration remains a classic that later illustrators did not want to, or could not alter too drastically. Illustrators choose Tenniel's images because they are central to the work; they are the embodiment of the work. As with any classic, very different interpretations would be inappropriate. Illustrators since Tenniel provide their interpretations of Tenniel's work in much the same way that artists through the ages have interpreted the work of the earlier masters: often with reverence.

STUDY WORKS

Following is a list of the works used in our study. This list provides the works in chronological order by illustrator and includes a full bibliographic reference. Note that several of the citations list later publications, and in some cases facsimiles, of an earlier work.

1865 John Tenniel
Carroll, L. (1977). *Alice's Adventures in Wonderland.* New York: St. Martin's Press.

1907 Bessie Pease Gutman
Carroll, L. (1907). *Alice's Adventures in Wonderland.* New York: Dodge Publishing Co.

1907 Arthur Rackham
Carroll, L. (1978). *Alice's Adventures in Wonderland.* New York: Weathervane Books.

1914 A. E. Jackson
Carroll, L. (1914). *Alice's Adventures in Wonderland.* Garden City, New York: Garden City Publishing Co.

1922 Gwynned Hudson
Carroll, L. (1992). *Alice's Adventures in Wonderland.* London: Studio Editions.

1939 David Hall.

Carroll, L. (1986). *Alice's Adventures in Wonderland.* New York: Simon & Schuster.

1951 Walt Disney Co.

Disney, W. (Producer), Geronomi, C., Luske, H. & Jackson, W. (Directors). (1951). *Alice in Wonderland* (film). Burbank, CA: Walt Disney Co.

1949 Leonard Weisgard

Carroll, L. (1949). *Alice's Adventures in Wonderland and Through the Looking Glass*. New York: Harper & Brothers.

1972 Ralph Steadman

Carroll, L. (1973). *Through the Looking Glass.* New York: Clarkson N. Potter.

1983 Michelle Wiggins

Carroll, L. (1989). *Alice's Adventures in Wonderland.* New York: Alfred E.Knopf.

1985 Michael Hague

Carroll, L. (1985). *Alice's Adventures in Wonderland.* New York: Holt, Rinehart & Winston.

1986 Justin Todd

Carroll, L. (1987). *Through the Looking Glass and What Alice Found There.* New York: Schocken Books.

1988 Anthony Browne

Carroll, L. (1988). *Alice's Adventures in Wonderland.* New York: Alfred A. Knopf.

1989 Peter Weevers

Carroll, L. (1989). *Alice's Adventures in Wonderland.* New York: Philomel Books.

1992 John Bradley

Carroll, L. (1992). *Alice's Adventures in Wonderland.* Philadelphia: Running Press.

1992 Donna Leslie

Sheppard, N. (1992). *Alitji in Dreamland or Alitjinya Ngura Tjukurmankuntjala.* Berkeley, CA.: Ten Speed Press.

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1993 Tony Ross

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Davis, J. (1972). Introduction. In G. Ovenden (Ed.) , *The illustrators of Alice in Wonderland and Through the Looking Glass* (pp. 7-15). New York: St. Martin's Press.

De la Mare, W. J. (1930). Lewis Carroll. In V. Haviland (Ed.). *Children and* *literature: Views and reviews*, (pp. 57-63). New York: Lothrop, Lee & Shepard, 1973.

Erdman, B. (1988). *Lesson into film*. Unpublished doctoral dissertation, University of Wisconsin-Madison.

Feaver, W. (1977). *When we were young: Two centuries of children's book illustration*. New York: Holt, Rinehart & Winston.

Gardner, M. (1960). *The annotated Alice*. New York: Bramhall.

Hamilton, J. 1990). *Arthur Rackham: A biography*. New York: Arcade.

Moser, B. (1987). *Artist at work: Illustrating the classics*.Horn Book Magazine. 63:703-709.

Pudney, J. (1976). *Lewis Carroll and his world*. New York: Scribner's.

Smith, J. A. (1948). *Children's illustrated books*. London: Collins.

Thwaites, M. F. (1963). *From primer to pleasure in reading*. Boston: Horn Book.

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Visual Literacy in General Education at the University of Cincinnati

Hermine Feinstein
Robert Hagerty

For the past several years many institutions of higher education have initiated programs to improve the general education of undergraduates. Those programs typically identify three components that need improvement: writing, speaking, and critical thinking. The visual component, for the most part, has been ignored. This fourth component, however, **has been included** in the general education program at the University of Cincinnati.

Two years ago, a committee was formed: Hermine Feinstein as chair from the College of Art, Robert Hagerty from the art department of a branch campus, Claudia Taylor from mathematics, and Manfred Wolfram from electronic media. Our charge was to design and implement faculty development workshops. Last year we conducted two workshops; this year we will conduct two more. The workshops, which accomodated 30 participants from a variety of disciplines, were held about 60 miles from Cincinnati for two days each. The front cover of the invitation is shown in Figure 1.

Definitions and Rationale

The workshops began with our working definition, our rationale, and a short review of the research on the instructional use of visual images. We provided the participants with workbooks that contained an expanded definition and rationale, and explanations of the exercises in which they were to participate. Figure 2 is a condensed version of our definition.

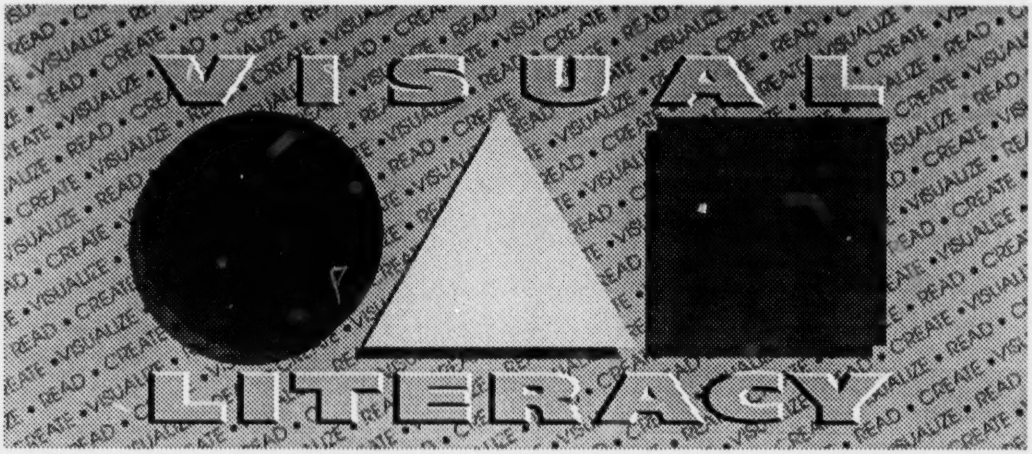

Figure 1 . Front cover of workshop invitation.

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VISUAL LITERACY IN GENERAL EDUCATION

Visual literacy, one of the four components of General Education, is the acquired ability to visualize internally, to create visual images externally, and to read visual images in the natural and built environment.

THE THREE ABILITIES

A. ***TO VISUALIZE***

1. Stimuli *that are not* discipline related
   To see in the "mind's eye": concepts, configurations, consequences, direction, feelings, flashbacks, layering, motion, outcomes, scenarios, sequencing

   (Note: A.1 provides practice for A.2)

2. Stimuli *that are* discipline related
   To make abstract ideas concrete and vivid through figurative language or through visual images. To clarify or enhance ideas, be they spoken, written, musical, or gestural through visualization by exploring disparate ideas and finding their commonalities

B. ***TO CREATE***

1. To create visual images in *non-art related* endeavors. This involves both creating and understanding (being able to read): graphs, charts, diagrams, tables, technical illustrations, conceptual models (2-dimensional or 3-dimensional), and instructions that illustrate ideas and information

2. To create visual images in *art related* endeavors applies primarily to those in the studio disciplines throughout the University but does not exclude novices

C. ***TO READ***

To read visual images in the natural and built environment means to interpret them literally or metaphorically. In the built environment, images, singly or in combination, could include: architecture, urban design, landscape design, industrial design, interior design, graphic design, fashion design, painting, drawing, printmaking, sculpture, ceramics, crafts, jewelry, fibers, TV, movies, video, photography, and those images computer generated.

Although the ideal goal in reading visual images is a synthesis of the categories of interpretation identified below, interpretation may include activities in any of the following five categories:

1. Description, a general inventory of what is seen, yields a literal interpretation
2. Historical Considerations take into account influences, context, environment, or situation
3. Analysis determines how the image was composed or constructed
4. Metaphoric Interpretation answers the question: What else, other than the obvious, can the image represent?
5. Evaluation answers the questions: Is the image as good as...? Or does the image represent phenomena adequately?

Figure 2. Condensed version of definition.

Before enumerating four reasons why being visually literate is important, we reminded the participants that by the time we were in the first grade all of us had some basic skills in communication. We were able to talk, to read, to write, and to draw stick figures. Through the years our talking, reading, and writing skills were developed further through teaching, though with less and less success as evidenced by national test scores. But our visual skills, for the most part, were not developed. They were left dangling, to develop, if at all, by our outside interests and by outside influences.

Knowing "how" to see, how to decipher images, has long been thought to be the exclusive province of artists. Yet in today's world, knowing "how" to see is crucial for everyone. Indeed the propensity for developing visual skills is part of our genetic and cultural inheritance (Koestler, 1975). Specifically, being visually literate is important because ***first*** it requires increased right hemispheric involvement, thereby engaging whole brain thinking. "Looking is a given; seeing is an achievement." That is the motto our committee. We mean that most of us are born with eyes capable of looking at the world. The **looking** capability increases in a general way as an "automatic consequence of maturation" (Eisner, 1972, p. 66). This looking capability, general visual awareness, is a mechanical and habitual process of vision, tending mainly toward surface or literal meaning, primarily a left hemispheric function. By contrast, **seeing** is an expanded interpretation of that mechanical and habitual process. Seeing is a focused awareness that enables us to make finer quantitative and qualitative distinctions. It also enables us to understand and create images as metaphoric symbols, an important right hemispheric function. Seeing, unlike looking, is not "an automatic consequence of maturation." Seeing requires the active and appropriate engagement of **both left and right hemispheres.**

The ***second*** reason why being visually literate is important is that it enables us to understand abstract left brain concepts by making them vivid, concrete, and familiar. For example, the concept of genetic inheritance (nature) can be likened to the hard wiring of a computer. The concepts of experience and education (nurture) can be likened to computer programs. Here, the mental gymnastics of likening one thing to another involves visualization.

The ***third*** reason why being visually literate is important is that it allows us to consider the same concept in different ways. When brain researchers (Levy and Trevarthen, 1976, p. 302) tested the different aptitudes of the left and right hemispheres with both split-brain patients and normals, the researchers found consistent differences. For example, subjects were shown to their right visual field (left hemisphere) three pictures: an uncut cake on a plate, a round brimmed hat, and a fork and spoon. When they were asked to match similar objects, they matched the fork and the spoon with the cake on a plate. *Their left hemispheres attended to similarities of function.* When the subjects were shown the same pictures to their left visual field (right hemisphere), they matched the round

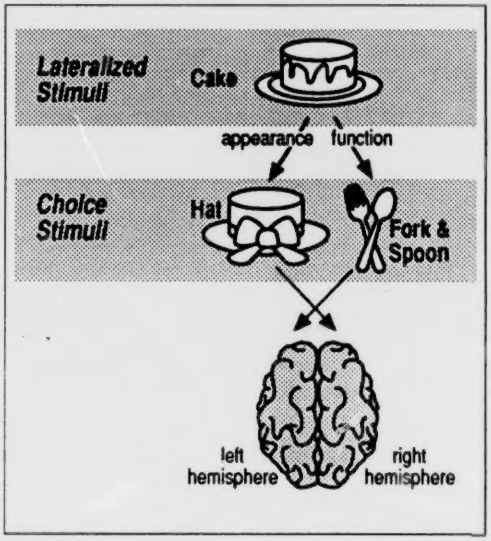


Figure 3.

brimmed hat with the cake on the plate. *Their right hemispheres attended to similarities of appearances and structure*. The point is that we process the same information with each hemisphere, **but** we do it differently.

The ***fourth*** reason why being visually literate is important is that it empowers us to read and understand the visual environment so that we are, insofar as possible, not manipulated by it and can make informed decisions. Consider for a moment that visual communication is advanced by such media as photography, television, and computers. All those media are being used to create what is now known as "virtual realities," realities of intangible visual images, many of which embody subliminal stimuli. It behooves us to learn how to decipher those realities. Indeed, it behooves us to regrind our visual lenses.

Structure of the Workshops

The workshops were divided into the three components that corresponded to our definition: ***to visualize*** internally, ***to create*** visual images externally, and ***to read*** visual images in the natural and built environment.

A. To visualize internally
1. stimuli ***that are not*** discipline-related

Before the participants engaged in visualizing stimuli that were not discipline-related, we had them do some relaxed attention exercises that release excess tension. These exercises included stretching of the neck, arms and hands. We then asked them to picture the outside of their front doors. We asked them to note the color, to note whether it was solid or had windows, and to note whether the doorknob was on the left or right. We next asked them to envision the inside of a supermarket, a vacation, a safari. Finally, we asked them to imagine they were looking at their reflections in a mirror. The reflections that we suggested did not reflect their exact images. Rather, they reflected images of themselves in different moods and in different sizes.

There are three points to these exercises. First, all of us are capable of visualizing to some extent. Second, given a common stimulus, our visualizations will tend to differ. Third, visualizations *that are not* discipline-related can be improved with practice. That practice, in turn, can strengthen visualizations *that are* discipline-related.

A. To visualize internally
2. stimuli ***that are*** discipline-related

In exercises A.2. the task for participants was to make concepts visual in the minds of their students. The participants were shown a list of concepts from several disciplines and an analogy for each that would conjure a visual image. See Figure 4 for a partial list.

The analogy for psychotherapy, having braces on your teeth, prompted much discussion. Several people objected to this image because it implied that psychotherapy was a method for achieving conformity. Others said that, on the contrary, psychotherapy, like braces, must be fitted to the individual. The analogy is effective because it generates argument. It can be modified to suit a particular point of view and is an excellent image for clarifying one's thoughts on the subject. Another analogy on this list was contributed by one of the participants who teaches business, in particular group growth and development over time. The underlying concepts are that groups form, discuss their tasks (storm), reach consensus (achieve a norm), perform their tasks, and eventually adjourn. While doing her workshop homework (to be described subsequently) it occurred to her that the image of baking a cake might be an apt analogy. Form would be to collect the ingredients; storm would be to mix them; norm would be the finished batter. Perform would be to bake the cake; adjourn would be to eat the cake.

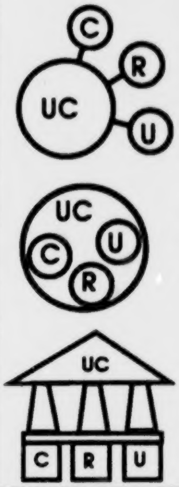
After a discussion of these analogies our committee member, who teaches mathematics, gave a presentation of ways she makes mathematical concepts visual for her students. She has them visualize many different analogies, personifies concepts, and places them in environments in which they interact, often humorously.

B. To create visual images externally
1. In ***non-art related*** endeavors

An exercise we used for creating visual images externally in non-art related endeavors was to create a visual dialogue. We worked on the principle that ***the underlying image governs the perception and drives the verbal dialogue or argument.***

For this exercise we used a situation in the University of Cincinati that was controversial at the time. The University has three two-year branch campuses. The state legislature was considering separating them from the University and making them part of a state community college network. We asked the participants how they perceived the role of the branch campuses. Their perceptions, however, had to be stated in non-verbal terms as a sketch. Three examples are shown in Figure 5.

Perceptions of the Relationship of the University to Its Branch Campuses



This sketch showed that the branches were external and could be cut away with no harm to the University.

This sketch showed the branches as an integral part of the University.

This sketch showed the branches as the foundation of the University.

Figure 5.

A.2 To Visualize Internally: Stimuli THAT ARE Discipline-Related

Remember:

- **Analogies prompt visualizations**
- **Analogies are not a one-to-one correspondence**
- **Analogies both highlight and hide**

SUBJECT	CONCEPT	WHAT IT COULD BE LIKE (Analogy)
Art	Analogous colors	Neighbors living on either side of you
Statistics	Latent variable	A hidden hand waiting to emerge
Psychology	Psychotherapy	Having braces on your teeth
Business	Group growth and development over time (form, storm, norm, perform, adjourn)	Baking a cake

Figure 4.

Whether these arguments are valid, the visual image can be relied upon to **govern the perception and drive the verbal dialogue**. Once the image is elicited, often a surprise to its owner, it then can be examined. If desired, adjustments can be made in one's thinking.

Another way to use visual images in non-art related endeavors (or art related) is by an associative search strategy called clustering (Feinstein, 1989, 1980; Rico, 1983, 1976). Clustering enables one to spill and sort impressions, ideas, and feelings. It is a nonlinear form of brainstorming, synonymous with webbing. It precedes focused thinking, promotes lateral thinking, captures and generates thoughts, puts them in slow motion, makes them visual, and reveals patterns and relationships.

Clustering begins with a circled nucleus word and radiates outward. It requires unlined paper, a willingness to engage one's imagination and a willingness to defer judgment. Whatever is clustered can be weeded for redundancies and reclustered. It then can be reclustered yet again and used in a variety of ways. We gave an example using the color purple to show the connections and associations that can occur when clustering. See Figure 6.

Having given examples of clustering, we then assigned homework. Each participant was to cluster the courses he or she teaches, choose one and cluster several concepts essential to the course. They then were to choose one of the concepts and use that as a nucleus for a cluster that might prompt a visual analogy. The next day they were asked to teach their concepts to the other participants.

B. To create visual images externally
2. In ***art related*** endeavors

In the section on creating external images in art related endeavors we presented our version of the principles and elements of visual organization, shown in Figure 7. We illustrated them in 30 slides and provided definitions in the workbooks. Although the principles and elements of visual organization are known to artists, they often are unknown to those from other disciplines. Even a rudimentary knowledge of these principles and elements can be

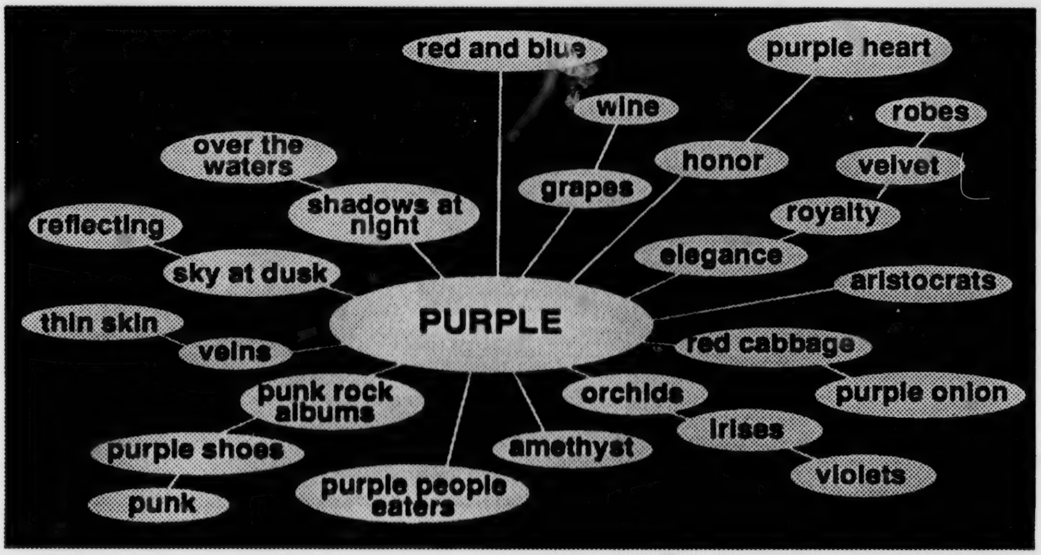

red and blue
purple heart
wine
robes
over the waters
honor
velvet
grapes
shadows at night
reflecting
royalty
sky at dusk
elegance
aristocrats
thin skin
PURPLE
veins
red cabbage
punk rock albums
orchids
purple onion
irises
purple shoes
amethyst
violets
punk
purple people eaters

Figure 6.

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useful both in creating visuals (even when made entirely of text) and in reading visual images. While showing the slides that illustrate the principles and elements we stressed how they are derived from human physiological and psychological experiences. We also showed and discussed some examples of weak and strong visual organizations, also referred to as designs or compositions.

The Principles and Elements of Visual Organization

Principles

- Unity
- Theme
- Variety
- Proportion
- Balance
- Movement
- Orientation
- Placement

Elements

- Line
- Shape
- Form
- Pattern
- Texture
- Space
- Size
- Color

Figure 7.

An exercise we used for the creation of external images in art related endeavors was a torn paper drawing. We asked the participants to pretend that they couldn't talk or write but that they had an important emotion to convey. The only way to convey that emotion was to tear up black paper and glue it to an 18" x 24" piece of white paper. Another restriction was that they only could use non-objective images (nothing that looked realistic, i.e., crosses, people, flowers, etc.). They were given 45 minutes to create their drawings which were then displayed on a wall. Several were chosen to be "read" or interpreted by the participants. Most of the interpretations were confirmed by their creators.

C. To read visual images in the natural and built environment

The third part of our definition is to read visual images in the natural and built environment. Here we had the participants engage in two activities: one was to interpret some still images, i.e., art reproductions. The participants were divided into small groups and were to choose one image from a set of three. They were asked to describe to each other literally what they saw using as many art terms as appropriatefrom the principles and elements of visual organization. They were to avoid interpretation, analysis, and personal preference. The next step was to individually interpret what they saw metaphorically. The instructions were to cluster responses to the following:

a. What feelings does the image evoke? (Try to use the most basic ones, e.g., anger, fear, happiness, pain, loneliness, or their synonyms.)
b. What else, other than the obvious, can the image stand for?
c. Where, in the image, is the visual evidence that supports my interpretation?

They were told that the combination of a. and b. would be their metaphoric interpretation. in other words, they would have created a verbal metaphor from a visual one. To complete this activity, the small groups were asked to select the most apt interpretation and choose a spokesperson to share the interpretation with the larger group.

For the second activity in this section on reading images we had them interpret moving images, video and TV. Another of our committee members, an instructor in electronic media, used clips of TV shows and commercials. He explained how the principles and elements of visual organization also are used in moving images. He showed how composition, i.e., color/lighting, size, placement, movement/pacing emphasized particular visual messages—explicit, implicit, and subliminal. After this last presentation, we summarized the workshop, collected the evaluations, and adjourned.

In conclusion, although visual communication is pervasive in our culture, it is not recognized as a leading modality of human communication. Nor is it taught systematically by our educational institutions. Indeed, by the time our students reach adolescence, they have been exposed to thousands of hours of visual stimuli without the necessary skills to decipher and use the evocative power of images to understand the world around them. As a result they, and most of us, are left to react to predetermined and predigested visual stimuli. This state of affairs needs to be changed. We, at the University of Cincinnati through our faculty development workshops, have made a modest beginning toward changing that state of affairs. To be an educated person requires being visually literate. Being visually literate depends on three acquired abilities: the ability **to visualize** internally, **to create** visual images externally, and **to read** visual images in the natural and built environment. **VCR** is a fitting acronym and one whose time has come!

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Integrating Visual Literacy Across the Curriculum

Ladislaus M. Semali

Introduction

Over the past quarter century, communication technologies have spawned an explosion of possible ways in which "text" is part of the out-of-class curriculum, both written and electronic, from photographs to film to videotext. Attempts to integrate these "texts" across the curriculum in learning environments remain problematic.

This paper will explore some specific steps being taken to achieve integration of media and visual literacy across the curriculum of secondary school classrooms. Integration as such is not a novel concept, but integrating visual literacy across the curriculum is new to many schools in the United States. In short, visual literacy is the ability to read, interpret and understand how meaning is made and derived from photographs and other electronic visuals. In practice it consists of understanding connotative messages embedded in the text of the visual as well as interaction of pictures to words, the context of the viewer, and relayed messages obtained from the maker of the image.

Integrating visual literacy across the curriculum is an important project. In the Commonwealth of Pennsylvania as well as elsewhere in the nation, there is broad support for integrated curricula. The integration of skills and content has been the central concept of the essentials of education advocated and backed by nationwide organizations that include the International Reading Association, the National Council of Teachers of English, the National Council for Social Studies, the National Association of Elementary School Principals, the Association for Supervision and Curriculum Development, and the National Education Association.

These organizations of educators have for the past decade advised teachers and other educators that processes and abilities do not grow in isolation from content. They insist that students acquire these processes and abilities through observing, listening, reading, talking and writing about science, mathematics, history and the social sciences, the arts and other aspects of our intellectual, social, and cultural heritage. Their prevailing rationale is inspired by the belief that the separation of school from the "real world" only increases when the arts and media remain marginalized or extracurricular. Likewise efforts to increase literacy learning are rendered incomplete and irrelevant when they fail to acknowledge the meaning-making capabilities of art and visual media literacy.

As we approach the twenty-first century, schools cannot afford to dismiss or ignore art encoded in visual media and other mass media. Unquestionably, these forms constitute the newest currency of cultural literacy in our pluralistic society. In short, a vibrant, vital, and inclusive literacy has emerged outside the walls of the school, while the narrow view of literacy valued within the school remains, for many, inaccessible, irrelevant, and alienating.

Research Project-Overview

"Integrating Visual Arts across the Curriculum" is part of a broader research project in progress, designed in collaboration with the Pennsylvania State Department of Education to develop and implement critical experiences in visual arts and media education in the existing *Pennsylvania Framework of Reading, Writing and Talking across the Curriculum* (Lytle & Botel, 1990). This project initiates innovative collaborative processes that involve classroom teachers, educational specialists, administrators, university faculty, arts and media experts and students in reflecting on theory and practice in order to design, develop and implement a statewide integrated curricular framework of the visual arts and media education.

This project stems from statewide efforts to develop and promote integrated curricula to fit current educational needs. In fact, "Integrating Arts and Visual Literacy" enhances and complements the current *Pennsylvania Framework for Reading, Writing, and Talking Across the Curriculum,* and brings this statewide framework up to date to reflect Outcome Based Education (OBE) goals under consideration by the Pennsylvania State Board of Education (*Pennsylvania Education*, March 1993). These OBE goals are statements defining knowledge and skills required for graduation from public schools in Pennsylvania.

The Pennsylvania Framework for Reading, Writing, and Talking Across the Curriculum, provides a resource for educators throughout the Commonwealth to be used by any teacher, of any subject, at any grade level, or by a group of teachers or a group of school leaders and teachers to reflect upon, design or redesign their curricula and instructional practices.

In keeping with these OBE goals for communication, the present research project recognizes the need to expand the integrative model envisaged in the Pennsylvania Framework to ensure that all students, kindergarten through grade 12, acquire the ability to understand how visual media and particularly visuals represented in the mass media work to produce meanings. Given the time investment in these media experiences by school-age students, it is indeed the case that we are skilled participants in a variety of media events. Yet there is a question as to whether we possess a critical media knowledge. In other words, as long as our arts and media literacies remain "unschooled," do we remain media "illiterates?" A commentary in the National council of Teachers of English publication, *The English Journal* (Nelms, 1992), posited,

> Youngsters study reading and literature for twelve years and still graduate naive about the techniques and devices used to capture their attention and imagination, about the cultural codes that reflect and shape their thinking, in their own native literature - the electronic literature to which they have given their allegiance (p. 13).

Should schools integrate visual arts and media as legitimate curricular sites? If so, where might they fit within school curricula so that they are not separate "subjects," but "critical" languages and literacies, shared by educated persons? These are the questions and issues that we must confront if schooling is to be relevant to students' lived lives.

Aims of the Study

This study aims to produce, in conjunction with educators across the Commonwealth of Pennsylvania, an integrative curricular framework of visual arts and other mass media. It consists of a series of collaborative processes that involve teachers, educational specialists, administrators, university faculty, arts and media specialists and students in reflecting on theory and practice in order to design, develop and implement a statewide integrated curricular framework of the arts and media education. The goal is to use multi-stage processes to obtain baseline data on descriptions of beliefs about integrating visual arts and media in the curriculum, inventory of learning experiences and existing lessons, media instructional materials, media artifacts, student media productions and media hardware.

The overall assumption underlying this study is that all students, kindergarten through grade 12, can acquire without additional courses in the classroom the ability to understand how visual media and the mass media work and produce meanings, how they are organized and how to use them. In short, the outcomes of this project aim to produce a resource curricular framework that strives to develop a literate person who is able to read, write, listen, talk, analyze, evaluate and produce communications in a variety of media inclusive of print, television, music, video, film, radio, compact disk, hypertext for personal computers, and the arts.

This work affirms that learning involves complex intellectual knowledge and skills that enhance the ability of individuals to continue to educate themselves throughout their social life. An indispensable component of such lifelong learning consists of actively questioning the social, political, and cultural structures and media artifacts that comprise the fabric of everyday life (Schwoch, White & Reilly, 1992). Engaging visual arts and media culture is of vital importance because these are major curricular sites of everyday student learning.

Making Schools Relevant to Life: Integrated Pedagogy

The mass media have been educational sites for a long time now, and their existence shows that the era of the omnipotent teacher with his "ex-cathedra" pronouncements has come to an end. Given this awareness, plus the availability of other new services designed to facilitate the running of schools and the changes that have occurred in the whole infrastructure of schools, it makes us realize that the universal backwardness of school practice is paradoxical.

The main criticism levelled against schools nowadays is that conditions inside are not in harmony with conditions outside. To improve this situation, attention must be paid to three important areas (a) adaptation for pedagogical purposes of the way in which abstract knowledge is acquired (in school and outside school); (b) development of critical and up-to-date principles and methods of illustration; and (3) better practical use than hitherto of critical thinking skills.

One of the more successful strategies used to counteract this charge is to take seriously student-centered teaching strategies. George Gerbner suggests that media study is in fact "tantamount to re-instituting liberal education, for it liberates the individual from an unquestioning dependence on the classics, and the achievements of humankind (Gerbner, 1972). Through media study for instance, students broaden the meaning of the word "culture" to include the entire social environment. In Canada, Britain and Australia where media literacy has been taught since the 1980s, students use cultural analysis to find connections in the entire social environment. For example, they have learned to use their critical thinking skills to deconstruct packaged media messages like television commercials, or political campaign messages to insure an informed citizenry.

Len Masterman (1983) believes media education is about empowerment and strengthening society's democratic structure. Central to media education is helping students understand that media mediate, which means the media do much more than merely record reality and reflect it. Media including film, television, advertising, and the news -- create representations of reality. Although the images and the stories may seem real, or "true to life," they are always structured to represent a particular point of view, perspective, ideology, or value system.

If we are to provide students with communication skills for today and tomorrow we must help them to comprehend and communicate through both traditional and emerging technologies of communication. Making these changes requires that teachers are trained in the emerging literacies and that principals, superintendents, and administrators value and respect the relationship between the literacies.

Unfortunately, the "cultural inquiry model" being suggested here and other student-centered teaching strategies like it, demand a teaching paradigm very different from those practiced in many American schools today. The current pedagogical styles in schools today are pragmatic, and skill-based, relying on rote learning and lecture. The public is unfriendly to the idea of student-centered learning because educators, parents and politicians alike are more comfortable returning to older ways of "return to the basics" which often means more lectures, and "test-taking".

In Pennsylvania, for example, the legislature, after a lengthy and cumbersome debate, has recently introduced "student learning outcomes education" partly as an attempt to steer the curriculum away from this pragmatic model of teaching. Even then, the implementation of an outcome-based curriculum will not be without significant disagreements.

Method and Sample

The process to develop and implement critical experiences in visual arts and media education in the existing ***Pennsylvania Framework of Reading, Writing and Talking across the Curriculum*** is informed by a field study (in progress) of ten selected schools teaching about media in Pennsylvania. The objective of the field study is to collect data through qualitative methods about current practice in the use of critical media education in classrooms.

A total of 30 teachers were interviewed and polled with a questionnaire to obtain their reflections on the use of visual arts and other media in elementary and secondary schools. Using a protocol developed with an open ended inquiry, interviews with these teachers focused on (1) what problems and concerns does the teacher encounter? (2) what kinds of support does the teacher find valuable? (3) how does the teacher's understanding of the process of children learning to read, write, listen, and talk across the curriculum change as a result of efforts to integrate arts and media?

Overall, the method used in the ten schools was focused to examine existing innovative collaborative processes that involve classroom teachers in reflecting on theory and practice. Interactions between the teacher and students as they each act upon the learning environment provided the laboratory for these media innovations. The goal was be to develop and implement a statewide integrated curricular framework of the visual arts and media education.

Research in Progress Outcomes

The preliminary results show that few classrooms teach about media. Out of the 10 schools visited, only teachers in two schools had a semblance of critical media education in their classes. Some schools in this sample had very elaborate equipment including satellite dishes, closed-circuit television, electronic mail connections and lots of video cassette recorders and film projectors. One school had fully-fledged production equipment. However, most teachers used media tools, namely as audio-visuals to illustrate instruction. Understanding the language of visual media was scanty. No attempt was made to explore how visual representations in curriculum materials privileged some ways of knowing over others and how the terms of such privilege related to the school's role in society. Teachers were not aware of their important role or responsibility and need to commit to constructing classroom practices that counter the ways in which sexism, elitism, racism and other oppressive formations structure classroom interactions.

The reasons given for this state of affairs were: (a) lack of media education training; (b) lack of reward system on the part of the administration for innovative and creative teachers that want to teach visual literacy in their classrooms; (c) lack of time; and (d) no attempt or encouragement for a global approach to integrating knowledge.

These findings are important. These preliminary results raise the question whether over and above the traditional teaching methods and strategies, teachers are expressly equipped with an educational methodology specifically designed for visual arts and the mass media. This question is increasingly pertinent in so far as hitherto the main emphasis in schools has been on the instructional aspect. As noted by Davis (1992), media use in the classroom is often limited to teaching ***with*** media rather than ***about*** media. Videotapes, for example, are often used in a way very analogous to textbooks: students are shown a videotape, then expected to regurgitate its content in a quiz or test. There is little exploration of how the videotape or the video format itself might color the content. Fortunately, the more frequent use of video in the classroom means that many U.S. teachers are now comfortable teaching ***with*** media, but teaching ***about*** media -- as media educators do in other countries -- is still rare.

Conclusion

The primary objective of this study was to obtain baseline data to guide the development of an integrative curricular framework of visual arts and other media. As we embark on this process of developing a framework, three tasks emerge: (1) design curricula that integrate arts and media literacies; (2) develop school sites in which the designed curricula can take place; and (3) further implement programs through the dissemination of research findings and the creation of networking operations under the auspices of the State Department of Education and the Pennsylvania State University.

The lessons we have learned thus far point to the need and timeliness of this project. There is urgency to introduce a critical pedagogy in teacher preparation colleges and classrooms. Educators and administrators need to become aware of media education in general, and must address the relationship between visual representation and the construction of knowledge in education media in particular. The myth that the accepted conventions of film, video, and photographic representation are mere neutral carriers devoid of content implications no longer hold ground.

The training of teachers should include integrated materials providing an education in mass information ranging from the pre-school to the university and even to the adult-education age. During these courses, teacher-trainees would acquire the knowledge and competencies that would enable them to teach their students, or at least familiarize them with, the process of evaluating knowledge obtained through the visual arts and mass media. The process would also include critically systematizing this knowledge and integrating it into the knowledge obtained at school. As facilitators, teachers would help students take an exploratory stance to probe their relationship with media. This encourages students to raise issues and questions in response to media texts, including the textbook.

In an attempt to design curricula that integrate arts and media literacies, I have initiated a media literacy course at the Pennsylvania State University for preservice teachers. Offered every semester, this course aims to insure that teachers achieve the competencies to: (1) recognize, read, comprehend and question ideas and information whether conveyed through print or picture; (2) critically analyze, and evaluate media messages for simplification, distortion, bias, and propaganda, and the competency to teach these skills to elementary and secondary school students; (3) manifest insights into multicultural education -- the knowledge to analyze both the content and origin of media messages, focusing attention not just on what groups are represented and how, but also on why those patterns of production exist, and (4) demonstrate their ability to enhance visual learning and the value of imagery in instruction. For history and social studies teachers, media literacy offers a dynamic way to explore the construction of history and social representations in everything from picture books to advertising, television, and film. For example, teachers who attempt to understand stereotyping, bias, and prejudice in the media or in the curriculum must focus on the issue of ownership.

Since our focus is on language and literacy education, we apply the **narrative analysis method** to study visual representations. In the analysis of visuals used for advertising in various print media or textbook illustrations, students strive to uncover some of the narrative meaning by: (1) questioning the order of events depicted; (2) the actual history of visual production, circulation and consumption; (3) who produced the visual; (4) under what circumstances and (5) for what possible reasons.

My experience in using the narrative analysis method with students shows that these questions can help them discover other possible meanings within the photograph.

Students learned by analyzing textbook photographs that publishers have a great deal to do with some of the photographs selected. The myth that photographs in textbooks may serve only to break up a long text is no longer true. Because of the great expense involved, new photographs are not usually taken specifically for texts. Instead, publishers hire photo researchers to find appropriate photographs, thus drawing on already existing collections. The result is that the choice of photographs depends on what is already available, and what is available depends on what has been requested by authors in the past. This trend tends to perpetuate special interests, stereotypes, and biases in visual representation today.

The lessons learned by my students in the narrative analysis method illustrate that photographic representations are not always neutral or devoid of contentious implications, but that they actually reflect and shape content and power relations.

In summary, the design of the curricula, the school sites, and the lessons derived from field study and experimental classrooms, will accomplish the objectives as we move toward an integrative curricular framework of visual literacy across the curriculum.

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APPENDIX

Student Learning Outcomes
(Pennsylvania Education)
Outcome Based Education Goals

Communications

The outcomes (marked with a star) describe a literate person who is able to read, write, listen, talk, analyze, evaluate and produce communications in a variety of media inclusive of print and other media in our culture and the ability to deconstruct packaged media products to insure an informed citizenry.

(1) All students will use effective research and information management skills, including primary and secondary sources of information with traditional and emerging library technologies.

(2)* All students will read and use a variety of methods to make sense of various kinds of complex texts.

(3)* All students will respond orally and in writing to information and ideas gained by reading narrative and informational texts and use the information and ideas to make decisions and solve problems.

(4)* All students will write for a variety of purposes, including to narrate, inform and persuade, in all subject areas.

(5)* All students will analyze and make critical judgments about all forms of communication, as well as separating fact from opinion, distinguishing propaganda from the truth, recognizing stereotypes and statements of bias, recognizing inconsistencies and judging the validity of evidence.

(6) All students will exchange information orally, including understanding and giving spoken instructions. They will ask and answer questions appropriately and promote effective group communications.

(7) All students will listen to and understand complex oral messages and identify their purpose, structure and use.

(8) All students will compose and make oral presentations for each academic area of study that are designed to persuade, inform or describe.

(9) All students will converse, at minimum level of "intermediate low," as defined in the oral proficiency guidelines developed by the American Council on the Teaching of Foreign Languages, in at least one language other than English, including the native language if other than English.

Visualizing Classroom Instruction: Creating Visual Images for Preservice Teacher Education

Thomas E. Thompson
Beth A. Wiegmann

Infusing technology in teacher education is critical for developing teachers for the 21st century (Sununu, 1986; NSTA, 1990). Studies show if teachers are to use technology they must be provided with opportunities to experience technology as learners and users (Baird, 1991; Brooks, & Kopp, 1989; Smylie, 1989). Currently, efforts are underway at Northern Illinois University to produce a series of videodiscs for use in the undergraduate elementary teacher education program. These discs will serve two purposes: 1) for instructors to provide visual images of exemplary science teaching in their elementary science methods course, and 2) for undergraduates to use as a Level III visual library of selected science education topics commonly found in teacher education programs.

Teacher educators continue to explore ways of effectively presenting preservice teachers with exemplary examples of instruction. A wide body of research demonstrates that visual images are powerful teachers for students in education. Videodisc technology is replacing videotape as the most desirable method for motion presentations (Utz, 1991; Fritz, 1991). Videodisc technology has several application levels ranging from direct access to computer controlled instruction (Angelo, 1992; Litchfield, & Dempsey, 1992). This technology is ideal for instruction due to immediacy of access, multiple audio tracks, and mix of media that can be impressed on the disc. This project, sponsored by the Illinois State Board of Education, has captured classroom teachers teaching in their own classrooms to their own students. By digitizing this video instruction onto videodiscs the preservice teachers and instructors are provided a visual learning tool that has instant access to a variety of pedagogical information.

This project was designed to facilitate instruction in elementary school science education. Current trends in education call for providing meaningful instruction. In science education this means hands-on activities that allow students to construct their own meanings. This series of videodiscs is an opportunity to bridge theory into practice. It provided an opportunity to capture positive role models implementing outstanding pedagogic practice.

This paper will discuss the process that was undertaken to create the digitized images for the instruction of preservice teachers about science education.

Project Overview

Six outstanding teachers were videotaped on two separate occasions in their own classrooms teaching hands-on science to their own students. The lessons were designed by the classroom teachers and were an integral part of their normal science programs. The project resulted in the completion of six videodiscs entitled: ***Elementary School Science Instruction: Capturing Excellence.***

Each videodisc contains a twenty minute science lesson, and a reservoir of thirty second episodes that relate to the topic. The disc titles include: Process Skills I, Process Skills II, Interdisciplinary Science, Methods of Instruction, Classroom Management, and Questioning. Each disc contains four audio tracks: 1) the lesson as it happened, 2) the teachers' comments, 3) the students' comments, and 4) a science educator's comments.

Phase I - Teacher Identification

In the initial phase of the project exemplary teachers were identified. This process was achieved at the Illinois Science Teachers Association Conference in the fall of 1992. Potential teachers were identified by evaluating the list of nominees for the outstanding science teacher award and by peer recommendation. An attempt was made to select teachers from inner city and suburban schools, from a variety of grade levels, and representations of both genders. The final selection of teachers included two males: one suburban fifth grade and one inner city seventh grade; and, four females: one inner city second grade, one suburban fourth grade, and two suburban fifth grade.

After the six teachers were recruited they met at the university where they received inservice training with regard to the project. Philosophy of the project, science methodology, process skill acquisition, questioning strategies, and videotaping details were discussed. Lesson plans were made and submitted to the project director before videotaping began.

Phase II - Videotape Production

Prior to the first videotaping, the producer visited each classroom to identify any special technical concerns inherent in each classroom. Special attention was given to reduce those variables which might pose technical problems with on-site videotaping. These variables included such things as lighting needs, school intercoms, electrical outlets, heating fans, wall color, and ease of moving equipment during times when children were not in the halls.

During this phase each teacher was videotaped on location teaching a hands-on science lesson to his/her whole classroom. To reduce the children's inclination to act silly or to look at the camera, each member of the production staff explained his/her function, the equipment used, and the nature of their work at the university. This reduced the children's tendencies to focus on the crew rather than the classroom teacher. For the most part children were very cooperative and indeed focused their attention on the science activity rather than the confusion associated with videotape production.

A single betacam was used for videotaping. The teachers wore a wireless microphone and a shotgun microphone was used to record the children's comments. At the end of some of the science lessons, head shots of students were taken for editing purposes. Also, close-ups were made of teacher demonstrations and of students using small equipment that was difficult to see from long range. Each videotaping session lasted about two hours.

A rough edit of the half-inch videotape was created. Upon completion the videotape was taken back to the school for the children to view. Their comments regarding what they remembered taking place were recorded. A videotape player and monitor was placed in the front of the classroom. A betacam was focused on the television monitor in order to correlate the children's comments with the corresponding rough edit segment. After showing a brief segment, the tape was paused and the children were asked to reflect on what they saw. Often, the teacher or the project director asked them questions to trigger a response. The children were then instructed to state the question as an introductory phrase in their response. This enabled the viewer to understand the nature of the children's response.

Each teacher was invited to return to the university to view the same rough edit in the recording studio. Again, a betacam was focused on the television monitor in order to correlate the teacher's comments with the corresponding rough edit segment. The teachers were shown a brief segment and then asked to record their comments within a specified time frame. The science educator's comments were recorded in a similar manner.

Phase III - Final Editing and Laserdisc Pressing

Final editing was performed on two blank three-quarter inch parallel masters with identical timecodes. Tape one was used to record the final video portion along with the original sound track and the teacher's comments. To avoid problems during duplication, tape two contained the science educator's and the children's comments correlating to tape one's time code no video was place on tape two.

Each set of parallel tapes was subsequently transferred to the D-2 videotape format that contained all four sound tracks. The D-2 master videotape was sent to 3-M for videodisc pressing.

The final CAV videodisc contained chapters for each instructional segment and included built in stops. The stops were used to separate the thirty second episodes contained in the reservoir. They were installed to force the Level I viewers to stop at the end of each short segment before preceding to the next segment, thus attempting to promote reflection on the segment just viewed.

Final Products

Six videodiscs were completed using segments from both of the lessons conducted by each of the six exemplary teachers. Each disc was organized around a twenty minute model lesson from start to finish, followed by a reservoir of eight to fourteen, thirty second vignettes relating to the same theme. The following are the six topics chosen because of their likely inclusion in most elementary science education methods course syllabi:

Process Skills I -The basic skills of science such as observing, measuring, classifying, communicating, and predicting were highlighted. The featured fourth grade lesson focused on the topic of seashells. A reservoir of additional examples completed the disc.

Process Skills II - This disc covered integrated or more advanced skills like hypothesizing, inferring, recording and interpreting data. The featured fifth grade lesson focused on a study of dew point. A reservoir of additional examples completed the disc.

Methods of Teaching Science - Commonly used methods of discussion, guided discovery, and open inquiry were accented. The featured fifth grade lesson focused on the nature of matter. A reservoir of additional examples completed the disc.

Interdisciplinary Science -This disc examined ways to incorporate other content areas into a science lesson. Fourth graders were introduced to sensory awareness under the umbrella theme of National Parks. A reservoir of additional examples completed the disc.

Classroom Management -Creative techniques to maintain class control during hands-on science activities were emphasize. The featured second grade lesson focused on an activity where children identified common objects as either conductors or nonconductors. A reservoir of additional examples completed the disc.

Questioning - Questioning strategies were the focus of this disc. Methods of questioning were highlighted in this fifth grade science lesson. Students were involved in the dissection of light bulbs as a part of their study about electricity. A reservoir of additional examples completed the disc.

Looking to the Future

The videodiscs were originally intended for use in the preservice teacher education program at Northern Illinois University. However, before production began, the Illinois State Board of Education decided to distribute copies of each disc to other Illinois institutions involved in preservice teacher education. Furthermore, Educational Service Centers (ESC) were targeted to receive copies for use in inservice or staff development activities. In all, twenty-five copies of each title will be available to educators in the state of Illinois beginning in the spring of 1994.

Science methods instructors at Northern Illinois University will use the discs in two different ways. During lectures and discussions they will be used to illustrate pedagogical concepts with classroom scenes involving real hands-on science lessons. In addition, preservice teachers will be able to view the videodiscs on their own to review information presented in class or to expand their knowledge. For the first time in teacher preparation, preservice teachers will be able to view the same lesson through the eyes of a child, the teacher, a science educator, or their own, as it actually happened. Only with videodisc technology will the viewer be able to quickly switch between one of four audio tracks with a simple command.

The set of eight videodiscs under the title, ***Elementary School Science Instruction: Capturing Excellence*** will enable science educators to demonstrate examples of outstanding science instruction. With a large data base of visual images at the fingertips of an instructor, preservice students will have the opportunity to see positive role models engaging children in quality science lessons and hear four different perspectives with relative ease.

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Digitizing Images for Curriculum 21

Alice D. Walker

Introduction

Research indicates that students involved with interactive, visually-based materials outperform (Mayton, 1991), make significantly larger gains in achievement (Abrams & Streit, 1986), learn faster, have better retention (Bunderson, et al., 1981), and report significantly more positive attitudes toward learning (Cushall, 1987). As educators we believe that the effective use of multimedia stimulates the active involvement of the learner, provides opportunities for close-hand observation, and offers a safe environment for risk taking, experimentation, exploration, and problem solving. Despite these claims, we are told that technological innovations such as the videodisc and the compact disc are still having little impact on improving education (Bork, 1991). Disappointingly, we learn that ". . . the typical professor still adheres to the classroom in the same way it was set up at the turn of the century." (Cavalier, 1992, p. 32).

The National Science Foundation (NSF), in an effort to bring about major changes in education, has established the NSF Engineering Education Coalition Program. Five university consortia, namely ECSEL, FOUNDATION, GATEWAY, SUCCEED, and SYNTHESIS, are engaged in a multimillion dollar, five-year plan to design and implement new approaches to teaching. Goals include the implementation of new communication and information technologies to enhance the effectiveness and efficiency of the learning process. A primary focus of activity involves using interactive multimedia in the classroom.

Engineering Visual Database Project

At Virginia Tech a number of faculty have displayed interest in developing multimedia programs. However, a major obstacle in this development appears to be the lack of visual materials that are appropriate, readily accessible, and easily adapted. To explore faculty needs for expanded visual instructional materials, and to help provide for those needs, the Educational Technologies Division, in cooperation with the College of Engineering, is in the process of developing a multi-purpose multimedia engineering visual database. The database is designed not only to assist faculty members in bringing visual examples to the classroom, but also to provide materials for student group projects, student review, and recruitment efforts.

Phase One has included a survey of the engineering faculty at the schools in the SUCCEED consortium and an attempt at collecting quality images for inclusion on a videodisc. Each image received has been digitized, entered into both HyperCard and ToolBook stacks, and provided with a barcode for easy access and maximum flexibility.

Our original thought was that individual faculty and departments would have large collections of slides and other visuals available to be loaned to the project, digitized, and returned. The major task, then, would be to select images of the highest quality and the greatest usefulness. We soon learned, however, that there are a number of hurdles to be overcome in developing a visual database. We share some of these concerns in the hope that our experience may be of help to other developers.

Generalizations

1. Many faculty limit their use of visuals to blackboard sketches.

Change can be difficult and slow, particularly in the university setting. Many classrooms are equipped only with blackboard and chalk. Some schools have advanced to providing an overhead projector for each classroom, but only a few university learning environments currently enjoy the luxury of carefully designed, complete installations of modern technological tools. Departments are often reluctant to allocate scarce resources to new equipment and software which may rapidly become obsolete. *As a multimedia developer, you need to do a lot of convincing.*

2. Some faculty are hesitant to share their materials.

Faculty in general have limited time, limited resources, and are increasingly faced with challenges of larger classes, departmental responsibilities, and research obligations. Reward systems seldom recognize instructional development efforts. Even though many faculty would like to make their materials available to others, they do not have the time or incentive to write complete descriptions and provide other necessary information. *Do what you can to make life easier for the faculty, always emphasizing the potential benefits of cooperation.*

3. Copyright permission can be a problem.

Faculty often make 35 mm slides from photographs in textbooks and other publications. While this may be acceptable for face-to-face instruction, such materials cannot be used in media for wide distribution. Unorganized collections of visuals frequently are not documented as to source. Most manufacturers of videodiscs require indemnification from any claims of copyright infringement. *Be sure to get signed copyright releases for all materials used.*

4. Technological change is occurring rapidly.

Educational technology is advancing at a rate where it is difficult to keep up with the latest in digital compression algorithms, new authoring tools, and platform compatibility. A year and a half ago, when this grant proposal was first written, we were not ready to produce a CD-ROM in-house. Now we have that capability. Also, this fall each entering engineering freshman was required to purchase a computer with a built-in CD-ROM drive. Many headaches might have been avoided if we had restricted our proposal to the development of a CD-ROM. *Start small, then expand as resources permit.*

5. Compatibility is essential.

Given the rapid changes in technology, it is doubtful that eight institutions, or even the various departments within one institution, will have the same hardware and software. We found that our Educational Technologies division was using System 7.0.1, while our Video Broadcast Service was using System 6.5. Our Photo Lab was using Bernoulli storage disks, while we were using optical disks. Our Multimedia Lab was using 128 M optical disks, while we were using 650 M optical disks. Video was provided from contributing faculty on VHS, SVHS, and Hi-8--our Video Broadcast Service wanted to use only Betacam. *'If you want to surf at the leading edge, you must be prepared for constant changes and concomitant expense. You can't have it both ways."* (Vaughn, 1993).

6. Designing for cross-platform use is both difficult and expensive.

In attempting to make our product as useful as possible, we developed both HyperCard and ToolBook versions. Finding student personnel who are comfortable and proficient in both environments is not a simple matter. Even little things like naming files can produce problems. We began with descriptive file names for HyperCard. Then we realized we should have used eight character DOS naming conventions for easy conversion to ToolBook. We used PICT files for HyperCard thumbnails but had to convert to PCS and BMP files for ToolBook. *It's not much fun to rename hundreds of files.*

7. Prototypes are helpful.

As technology advances there is much to be learned. Processes that may have been successful in one situation will not necessarily produce the same results in another. Particularly when working with very large databases it is important to use formative evaluation, to test the product as you move along. *It is much more efficient to work out the details of transferring five barcodes than 500.*

8. If anything can go wrong, it will.

We endured the Blizzard of '93, which closed the campus for only the second time in the history of our university. We survived a hurricane-like storm that destroyed 100-year old trees and knocked out electrical power. Our Photo Lab moved their facilities to the other side of campus during the period when most of the slides were being digitized. The video equipment went down when the air conditioning failed and the temperature rose to 98 degrees in the editing suite. Text designed for 35 mm slides did not fit the safe title area of the video screen. Grandfathers died, the flu bug attacked, and student personnel graduated. *Be sure to build in plenty of lead time for the unexpected and unanticipated.*

Results

Despite our frustrations, we succeeded in meeting the terms of our contract--we produced a prototype videodisc, with over 700 images and 28 minutes of motion, as well as a HyperCard (see Figure 1) and ToolBook index, and a printed index with barcodes (see Figure 2).

We are currently in an extensive evaluation phase. Plans are to continue the project, to create new visual materials, and to press a CD-ROM. Our hope is that engineering faculty will begin to use these materials and discover that the visuals are useful in revising their courses for the 21st century. As other projects within the Coalition progress, we hope to be able to work with individual faculty in locating the images they need and implementing designs for Curriculum 21.

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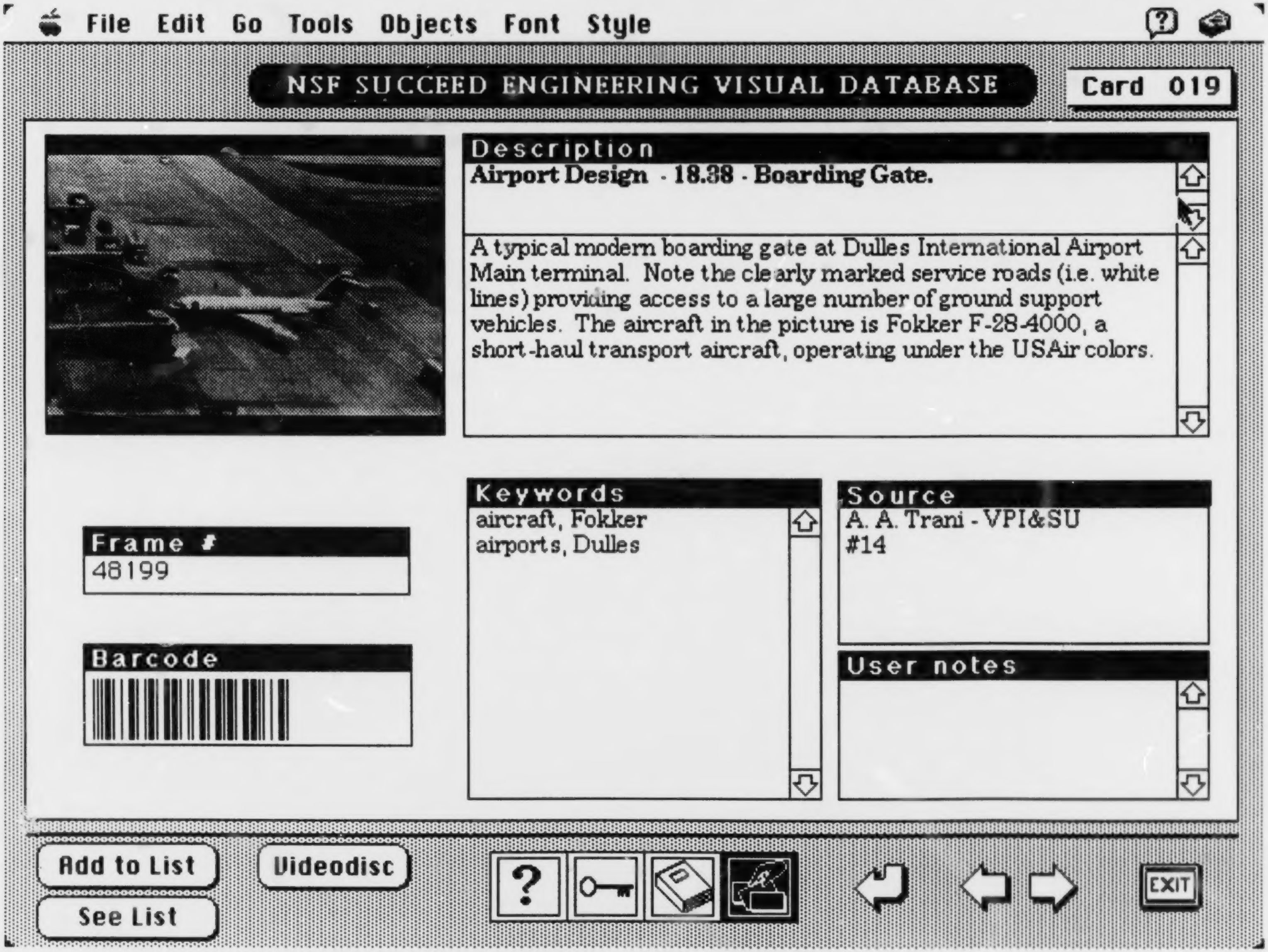

File
Edit
Go
Tools
Objects
Font
Style
Add to List
See List
Videodisc
?
EXIT

NSF SUCCEED ENGINEERING VISUAL DATABASE

Card 019

Description

Airport Design - 18.38 - Boarding Gate.

A typical modern boarding gate at Dulles International Airport Main terminal. Note the clearly marked service roads (i.e. white lines) providing access to a large number of ground support vehicles. The aircraft in the picture is Fokker F-28-4000, a short-haul transport aircraft, operating under the USAir colors.

Frame #

48199

Barcode

Keywords

aircraft, Fokker
airports, Dulles

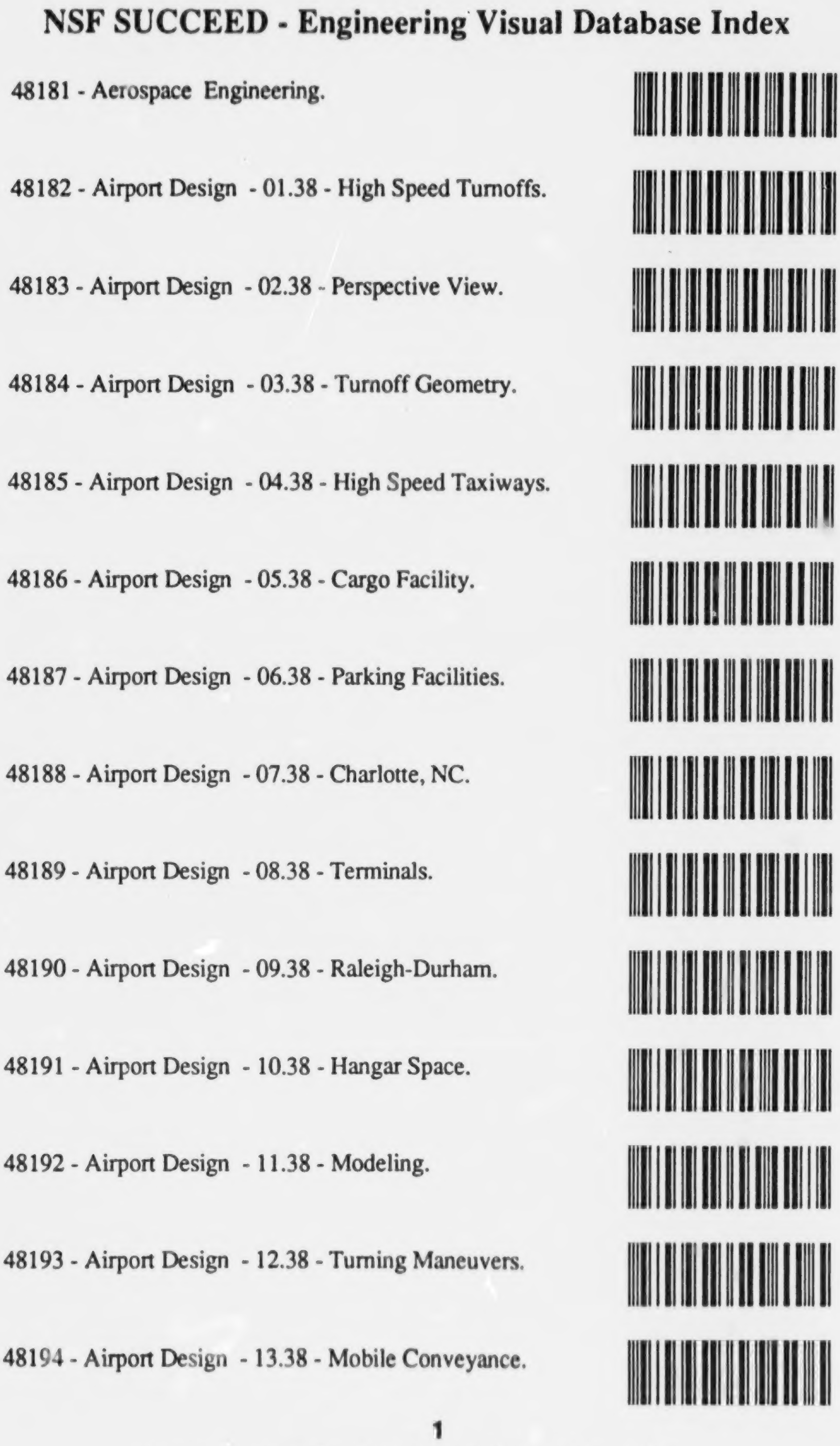
Source

A. A. Trani - VPI&SU
#14

User notes

Figure 1. Sample Card from HyperCard Stack.

BEST COPY AVAILABLE



NSF SUCCEED - Engineering Visual Database Index

48181 - Aerospace Engineering.

48182 - Airport Design - 01.38 - High Speed Turnoffs.

48183 - Airport Design - 02.38 - Perspective View.

48184 - Airport Design - 03.38 - Turnoff Geometry.

48185 - Airport Design - 04.38 - High Speed Taxiways.

48186 - Airport Design - 05.38 - Cargo Facility.

48187 - Airport Design - 06.38 - Parking Facilities.

48188 - Airport Design - 07.38 - Charlotte, NC.

48189 - Airport Design - 08.38 - Terminals.

48190 - Airport Design - 09.38 - Raleigh-Durham.

48191 - Airport Design - 10.38 - Hangar Space.

48192 - Airport Design - 11.38 - Modeling.

48193 - Airport Design - 12.38 - Turning Maneuvers.

48194 - Airport Design - 13.38 - Mobile Conveyance.

1

Figure 2. Sample from Printed Barcode Index.

Accommodating Technology in the Visual Literacy Classroom

Carla V. Lloyd
Kevin G. Barnhurst

In the last seven years, so-called "desktop publishing," has had the greatest impact on print design and pre-print production. According to a recent government occupational report, electronic publishing "is one of the fastest growing categories in the computer field" (Stanton, 1991). "Desktop" or electronic publishing means using "a personal computer, in combination with text, graphics and page layout programs, to produce publication-quality documents" (Stanton, 1991). These systems produce reader-ready or camera-ready documents that can by printed or reproduced by traditional methods.

Companies that spend billions of dollars annually on printing and publishing have embraced computer publishing (Stanton, 1991). They have seen how this technology saves them plenty of money and at the same time gives them greater control of their publications or documents. It has become a workable, low-cost solution for most business publishing needs.

While computer publishing software has ushered in many advantages, professionals acknowledge that this technology presents some fundamental problems. Most notably, it takes what used to be specialized design tasks and packages them. The programs are relatively easy to use. Yet experience with the technology is showing that many users don't have the design sense or skills to put the software packages to effective use. Bruce Robey, a former typesetting shop supervisor details the problem,

> "In the old system, the author dealt with content, the typesetter with form. Frequently, the results (under the new system) are an offense against typographical good taste" (quoted in Stanton, 1991).

Thus, computer published results can be disappointing for people without design experience. Jon Tarter writes in *Softletter*, a computer software newsletter, that "while mastering the software is easy, producing an attractive page demands a certain amount of visual literacy — design training and layout skills" (1986).

And according to some experts, the expectations for visual literacy has never been higher. Some proponents of visual literacy contend that we've moved from a text-driven society to a visual one. In the U.S., the television set is on for an average of 50.2 hours a week in white households and 73.6 hours in a week in black households, according to a 1992 study conducted by Bozell advertising agency (Sternberg, 1992), and all family members tune in. In 1993, A.C. Nielsen reported that among adults 18 and older, women watch television 4

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hours, 51 minutes a day; and men, 4 hours, 16 minutee. Teens tune in 3 hours, and children, 3 hours, 7 minutes per day (1993, Nov.). Nielsen also found that 75 percent of all U.S. households own at least one VCR. All of this TV exposure has some experts calling for visual literacy. Rutherford, a Canadian scholar, contends that visual literacy should become rudimentary training for all viewers. He proclaims:

> "Worshipping at the altar of false images in a world of rapid fire TV imagery, 'visual literacy' is at least as important as learning how to read" (1992).

Young people, namely the students we teach, particularly need visual literacy instruction. Messages aimed at teens are, as Foulsham describes in the article, "The Youth Cult of Zap, Crackle & Pop," filled with "kaleidoscopic editing, and often a presenter-free collision of sound, image and symbol" (1993). Foulsham suggests that teens are much more visually adept and that they can comprehend and absorb many different messages simultaneously. They become more "impatient with traditional images and narratives" (1993).

VISUAL LITERACY AND *COMPUTER LITERACY*

The rise of desktop publishing and the evolution to a visually-charged environment has professionals demanding more from college graduates. Today's job market requires computer literacy, computer publishing literacy, and visual literacy, to land entry-level positions in the following media: advertising; newspaper, magazine and book publishing; public relations; and graphic arts.

The S.I. Newhouse School of Public Communications at Syracuse University recently underwent a three-year review and re-design of the undergraduate curriculum. Multiple focus groups and in-depth interviews with marketing communications specialists, advertising practitioners and public relations professionals found that computer skills and visual literacy are important to students hoping to work in some aspect of marketing communications. These professionals endorsed the school's current visual literacy course requirement and identified three major skills which should be covered in the course. They include: an understanding of design, typography, layout, and semiotics; ability to produce documents on computer software; and an understanding of publishing processes.

THE COMPUTERIZED SOLUTION

To provide students with the type of instruction that would develop their computer proficiency and visual sensitivity, one instructional solution assumes that all design work will take place on a computer. This standard solution is computer driven (Barnhurst, 1991). To build skills and visual literacy, computers must become pervasive in the classroom, dorm room, and all-night lab. The students then live with the technology. Following this approach, we first proposed that the school equip a lab specifically designated for creative and visual instruction. Among other items, the proposal included computers at each student desk, which accounted for more than half the total projected cost. The more we explored the computer-based solution, the more problems we found, some more obvious than others. Here are the two most important problems with using computers as the primary venue for visual literacy and creative publishing training:

Budget. First, it's expensive. After the initial expense for remodeling, hardware purchases, software purchases, and allocating of space, we would still have to come up with funding for the ongoing expenses: staffing, maintenance, security and routine upgrading of equipment and software.

Content. Second, the computer technology can dominate visual learning. Promotional materials for "desktop" publishing tend to stress the software's simplicity and ease of use (Thompson and Craig, 1991). What tends to be downplayed in the promotional literature is the need for visual skills and design knowledge required to present clear ideas (Stanton, 1991). Computers can compete for attention in the classroom, especially when time in-class must be allocated to several different software packages, file integration, computer networking, and printer and scanner operation. The learning curve on software has grown "longer and steeper" as more complicated versions routinely arrive in the marketplace (Stanton, 1991).

Besides the limitations of cost and time, computers can present other structural barriers to learning visual literacy. Four types of problems arise when the computer drives the process of learning and working visually.

Hardware. Except in the most advanced multi-media settings, computers tend to isolate individuals in front of a screen. This configuration is antithetical to creative fields such as advertising, where teamwork has been essential to problem-solving.

Interface. Most computer software, by its interface design, puts the tools of ***production*** into the hands of students first. However, in media industries, conceptualization comes first. Seasoned practitioners will toy with design as they brainstorm, but production does not come before the Big Idea. The appearance of most layout packages on the screen invites the user to enter some words, choose type, and begin a layout, even before an idea has fully formed.

Software. Computers and their accompanying software offer students pre-packaged solutions (algorithms) to communications problems. And students can become tempted to use them. All the whistles and bells that a computer has to offer can take over the visual design, whether these algorithms are appropriate or not. Even word processing software comes with so many font styles, sizes, borders, and other visual manipulations that students want to use them all. The design takes form simply because the pre-set algorithms are available on the computer.

Output. The computer and other hardware, such as laser printers and scanners, create a polished output almost at once. This superficial precision can lull students into a false sense of skill or accomplishment. Those who say they can't draw a straight line with a pencil, suddenly produce precise lines and more.

All of these problems may in fact be considered advantages in a professional setting but students need to learn to manage all the freedom and power that computers put in their hands. Paradoxically, a tool that is a practical necessity in industry can prove an impediment in educating students to use that very tool.

A Visual Literacy Solution

To avoid these problems in the classroom, we searched for an alternative. The solution needed to rely less on computers. We had to find a way to achieve visual literacy from a pedagogical perspective. Rather than putting computers first, we wanted to put more gratification into analysis and critical thinking, the hallmark of true education. The facility itself, by its layout, equipment, arrangement and location, needed to serve these ends. How could we build an environment that was more conceptual, where analytical and creative problem-solving ability would get reinforced?

We began by breaking the tasks and activities of the classroom down into steps from the visual and creative learning processes. We identified several phases or cycles: research and ideation, rough drafting and critiquing, computer production, critiquing, and revising. Professionals cycle through these phases, moving smoothly back as well as forward as they produce their work. To train the neophyte to understand and begin the process, we decided to explore the idea of examining the phases from the perspective of different teaching spaces. First, computers, of course, would be a central component, but, second, we also considered how we introduce visual ideas, with room to talk around the table and the ability to show images from many sources. Third, students need space to work independently and in small groups, coming up with and sharing ideas. Fourth, students needed work spaces to assemble and mount their computer output. Finally, we needed a space where the students could show their work and have it critiqued.

Although this list identifies five places, on closer examination we found that some of the learning activities were similar and could be accomplished in fewer than five physical areas. In the end we settled on three learning spaces: A conference table, to give initial instructions and show examples, could also be used to critique and discuss students' work. A studio area, with design tables grouped in small clusters that put students together as they came up with ideas, could also be used to assemble and revise their work. And of course, a computer cluster, in this case shared with many departments, needed to be close enough so that stu-

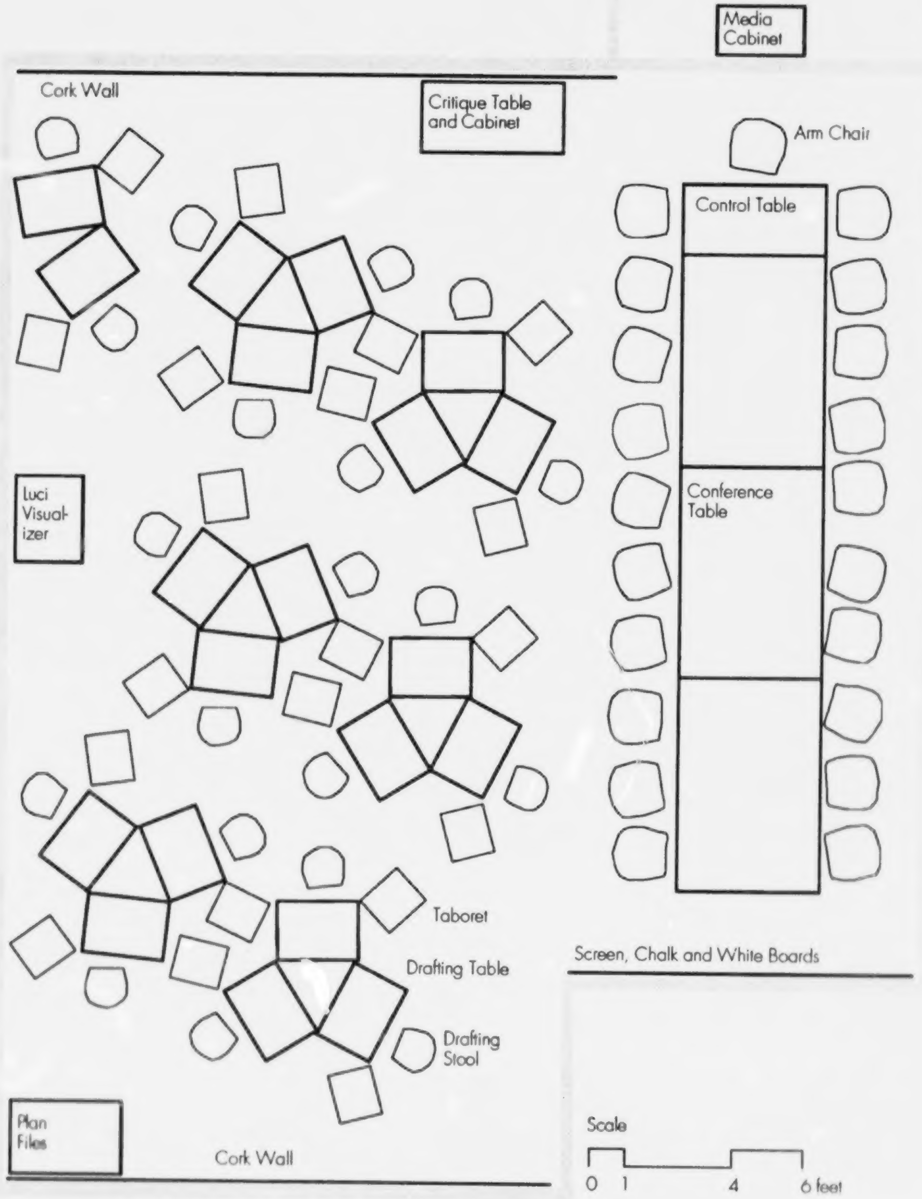
Media Cabinet
Cork Wall
Critique Table and Cabinet
Arm Chair
Control Table
Conference Table
Luci Visual-izer
Taboret
Drafting Table
Drafting Stool
Screen, Chalk and White Boards
Plan Files
Cork Wall
Scale
0 1 4 6 feet

DIAGRAM. CREATIVE VISUAL LAB. Floor plan with conference and worktable seating for twenty students, display facilities, and a separate control booth for a full range of audio-visual and interactive computer equipment. The computer clusters are located two floors below the classroom.

dents could move back and forth in a few minutes from one phase (and place) to another.

The diagram shows the Creative Visual Lab. The room is divided into two areas. A large conference table with 20 chairs fills the right-hand side, and a work area has seven clusters of design tables.

At the head of the table in the conference area, an audio-visual booth contains the equipment rack, dubbed the Tower of Power. This equipment helps instructors incorporate visual examples into lectures and also allows them to critique students' work. The audio-visual rack houses a 1/2-inch video cassette recorder and 3/4-inch video playback unit, both attached to a projector that casts the image onto a large screen located at the end of the conference table. Also included in the rack is a slide projector, CD player, cassette recorder/player, and computer. The computer also can be viewed through the projector and is networked to the central computer clusters. This arrangement allows students and instructors to open all software applications and student work available on the network directly in the Creative Visual Lab. The computer keyboard sits on a small pull-out shelf at the instructor's seat of the conference table, which can be locked when not in use. The computer has a built-in portable hard drive slot for large student projects (and for visiting professionals who want to bring large computer files to show), and a compact disk player, for demonstrating audio tracks used in copywriting. Sound from all the audio-visual equipment is supported by a subwoofer speaker system.

The projection booth also contains a portable document camera. This state-of-the-art device replaces both an opaque projector and an overhead transparency projector. A small video camera is suspended on an arm above the bed of the projector. Students and instructors can place ads and designs on the copy board and broadcast the image onto the screen. When the professor points out specific design elements or copy ideas, the pointing hand also projects onto the screen, as will any three dimensional example of advertising or publicity.

Advantages to a Visual Literacy Approach

As plans for this facility developed, other advantages emerged, besides the obviously lower cost to implement, equip, and maintain the room. We have identified seven specific ways in which the Creative Visual Lab helps build visual literacy.

Process. Educators have learned quickly that one real advantage of the educational setting is the ability to write course outlines that take a complex task and break it into a series of steps manageable for the beginner. By breaking up the creative process into separate spaces, the classroom actually helps students move conceptually through the design and advertising experience. Although they may not need the physical separation when they work as professionals, we believe it helps them understand and master work that may later become holistic.

Research. The new classroom places the computer at a physical distance, making it just as accessible as the tools used in research, such as the library and access to the client. The work space immerses the students in the problem but also encourages them to venture away from it to do primary research. Meeting with a client is as attractive and available as searching a data base supplied by computer network. As a result, students learn important research skills and habits of mind, and they're less likely to try to solve communications problems before doing adequate research. The computer is still a resource, but meeting clients is, too.

Creativity. Students begin with the instructor in the classroom, where they spend time thinking about the communications problem they've been assigned. Instead of rushing to execution, they spend the necessary time brainstorming, generating ideas, and "concepting." Some solutions in design, advertising, publicity, and research need to come from the human hand in action. A homemade or vernacular look can be found in experimental typography and layout and in post-modern advertising. The new work setting encourages students to seek inventive alternatives, rather than relying too heavily on the methods readily available on the computer.

Drafting. Producing sketches and rough ideas with pencil and paper leaves early tries in a draft stage. This incomplete, unpolished form pushes students to search for ideas and solutions to a communications problem, instead of coming up with a slick version of their first idea. The output by hand is never so dazzling as to lull students into thinking prematurely that the problem is solved. Thus they keep looking for other options. Students see rough drafts as ***drafts*** because they quite simply are ***rough***. They are encouraged to try more ideas and do more revisions before going to the computers.

Critique. Critiquing student work in the facility becomes easier for the instructor and for prospective employers. Once they've devoted inordinate amounts of time toiling on the computer designing elaborate ads that lack a hint of a Big Idea, students can resist feedback. Prospective employers are much less hesitant to criticize rough, early work, than to tackle a highly polished but misguided execution.

Execution. Executing — producing final work — is what computers do best. This is one of the primary reasons professionals appreciate and rely on them. Execution is a problem only if begun too early in the communications problem-solving process. The facility, by its physical arrangement and location, makes execution a much later step for inexperienced students.

Teamwork. The cluster arrangement of the design tables pushes students to work as teams during conceptualization and after critiquing. They also can't help seeing — and learning from — each other's work. Students discovered that they really like working in the room outside of class time. Because it is not under constant guard (the audio-visual booth locks separately) as computer facilities often are, the space is friendly. Students can go in at all hours, work on their projects, get away from the unblinking video monitor, and interact with other students from other fields of study.

The Creative Visual Lab has the benefits of having computers without the administrative burdens. As we planned to use the facility, the typical class would begin at the conference table, where the day's task gets introduced. Students then move to the work area, where they can come up with ideas individually and in teams. As they propose ideas, the instructor circulates and suggests revisions. Once they have a good idea, they can move into large-group critiques or into production, as the task demands. Because the classroom is near the computer labs, students can run down to the computers during class. Then they return to the conference table for a general critique. While reviewing students' ad or publicity campaigns or designs, called up from the network, an instructor can send those who need additional revisions of a similar nature to one of the work clusters to further evolve their concepts and thinking. They can return to the conference table after revisions are made. In other words, students don't have to wait until the next class session to receive instructor and peer feedback. The room also has large proof files where students can store their work.

Addressing the issue of computers and visual literacy is challenging. How can instructors do justice to both? The pedagogical problems we wrestled with, the issues we had to resolve, and the facility we created indicate one way the two can come together to provide students with the skills and knowledge demanded by today's communications professionals.

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Combating Computer Fear and Apprehension through Interactive Multimedia

Tom Hergert
Glen Holmes

Introduction

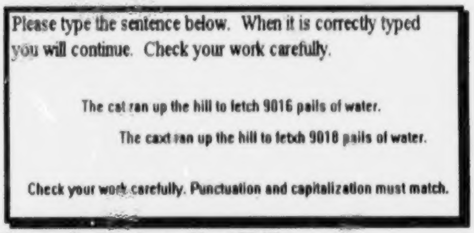
Changes in computer technology place unusual demands on learners, educators, and administrators. As technology changes and interactions with technology become more frequent, it is increasingly important to be able to gauge the relative skills and attitudes of both individuals and populations regarding technology and its attendant changes. The interactive tool discussed in this paper was created to aid in gathering information regarding these individuals and populations.

Rationale

The goal of this project was to develop a non-threatening, user-friendly instrument to assess computer skills and attitudes of pre-service and in-service teachers and administrators at all levels. The information gained through this assessment will be valuable in evaluating the current status of technology use by individuals and in larger populations. It will help to identify strengths and weaknesses in the status quo, thus aiding in the planning process for future training, applications, and allocation of resources. Instead of a pencil-and-paper attitude survey in this realm, this instrument uses the "feared" device to gather information *and* to deliver a positive experience using technology. There is disagreement within the team as to whether such an experience will have any measurable immediate effect and additional research will further illuminate the issues involved in this disagreement.

Description of Instrument

Created in *Authorware*, an icon-based interactive courseware development tool, this program gives each user a series of tasks, surveys, and audiovisual presentations regarding the use of computers in education. The only skills necessary at the beginning of the exercise are basic keyboard use and the ability to place a cursor using the mouse and to "click" when so instructed. These and other skills are expected to develop further in novice users during the course of the interaction. In some instances on-line help or remediation provides assistance/advice. Each participant proceeds through exercises, interactions, and surveys. Initial tests (Figures 1, 2, and 3) and a survey (Figure 4) establish a baseline of computer skills and attitudes for each participant. System elements are shown in Table 1.



Please type the sentence below. When it is correctly typed you will continue. Check your work carefully.

The cat ran up the hill to fetch 9016 pails of water.

The caxt ran up the hill to fetch 9018 pails of water.

Check your work carefully. Punctuation and capitalization must match.

Figure 1. Keyboarding Skills.

Feedback

The presentation of this instrument at the 25th annual IVLA conference in Rochester, NY, consisted largely of a conversation with other participants to determine merits/ weaknesses of the system as presented and to solicit suggestions for revisions and subsequent use. Attendees responded to the project and suggested possible populations for pilot studies. The discussion during and after the presentation illuminated negative and positive elements in the system, suggesting useful changes and areas for further research using this instrument.

The suggestions for revision of the piece ranged from making the system more economical by using fewer statements in the attitude surveys to adding more video vignettes representing other situations and attitudes involving technology in education. The main suggestions were:

1. Improve preliminary instruction set by rewording instructions for brevity and clarity.

2. Reduce provocative statements from 36 to 24 for the initial and exit attitude surveys and clarify remaining statements to avoid misinterpretation.

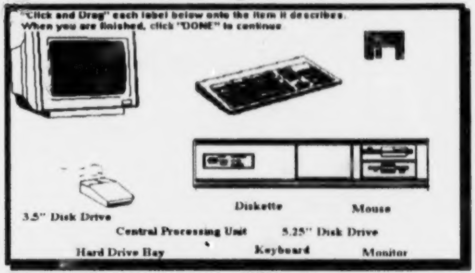
3. Print four statements and sliders per screen rather than six.

4. Establish alternate navigation strategies in case subjects have difficulties with the mouse.

5. Create additional video vignettes with positive/neutral interchanges among students/teachers.

6. Add "gentle" feedback during the interaction with statements such as "It seems that you are quite comfortable working with computers," or "Apparently you have some reservations about the use of computers in education".

Feedback on the system in general encourages further exploration using this project. Discussion participants were especially positive about the benefit of using the computer in a non-threatening environment to



"Click and Drag" each label below onto the item it describes. When you are finished, click "DONE" to continue

Figure 2. Parts Identification.

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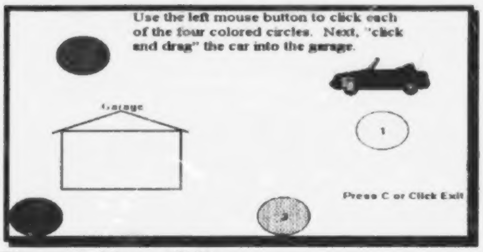
help subjects to consider their own attitudes and reactions while successfully interacting with technology. Many of the attendees at the presentation named specific groups, especially teacher populations, for whom they believed a program such as this one would prove useful. Five specific groups were identified with whom this system will be tested, three by participants at the presentation and two more by other conference attendees. Colleagues in other disciplines have expressed interest in using this modular system for research and training in their own areas of study. The system can easily evolve to accommodate other uses.

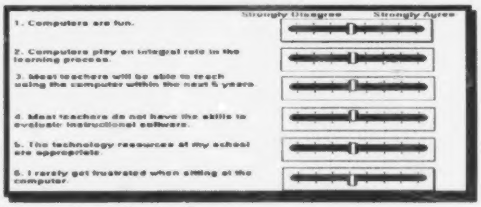
Table 1. System Elements.

Step	Title	Description	Interaction	Assessment
1	Demographics	Acquisition of demographic information (name and educator role)	Keyboard entry	None
2	Skills and knowledge (See Figs. 1, 2, 3)	Single-screen keyboard, single screen mouse, and computer parts identification tests	Keyboard and mouse	Timed Performance
3	Initial attitude survey (See Fig. 4)	Responses to provocative statements in four areas: positive personal, negative personal, positive world view, and negative world view responses to computers in education.	Graphic "sliders"	Numerical values recorded for each of four areas.
4	Video vignette 1	Portrays four elementary students in conflict over use of a computer	Operate video player	None
5	Vignette 1 reaction .	Responses to provocative statements specific to vignette	Same "slider" interface as in initial attitude survey	Numerical values recorded for each of four areas.
6	Video vignette 2	Portrays one secondary student working on a text-based assignment in cooperation with her teacher	Operate video player	None
7	Reaction to vignette 2	Responses to provocative statements specific to vignette	Same "slider" interface as in initial attitude survey	Numerical values recorded for each of four areas.
8	Exit attitude survey	Duplicates initial attitude survey	Graphic "sliders"	Numerical values recorded for each of four areas.



Use the left mouse button to click each of the four colored circles. Next, "click and drag" the car into the garage.

Figure 3. Mouse Skills.



1. Computers are fun.
2. Computers play an integral role in the learning process.
3. Most teachers will be able to teach using the computer within the next 5 years.
4. Most teachers do not have the skills to evaluate instructional software.
5. The technology resources at my school are appropriate.
6. I rarely get frustrated when sitting at the computer.

Figure 4. Attitude Survey.

Conclusions

From discussions, tests and the interactions at the IVLA conference it appears that this instrument should prove useful for its original purposes and perhaps for purposes not originally intended. The interactive system is being revised to reflect the feedback so far, and further research has begun with in-service and pre-service populations. It could become the basis for a valuable planning and evaluation tool in a variety of applications.

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IMSA - Enjoy the Journey

Jacqueline M. Layng

The Illinois Mathematics and Science Academy located in Aurora, Illinois is a pioneering educational community. It is the nation's only three year publicly funded residential high school.

The mission of the Illinois Mathematics and Science Academy, "a community of scholars dedicated to intellectual exploration, is to develop leaders who know the joy of discovering and forging interconnections among mathematics, science, the arts and the humanities, and who, by example and instruction, inspire others to live in harmony with themselves, other human beings, and the physical world" (IMSA, 1993, pamphlet).

This mission statement requires IMSA to achieve two separate goals. The first is to educate the gifted young of Illinois in math and science. The second goal is to share innovative educational findings with other schools in Illinois. This paper will describe the history, academic program, admissions procedures and statewide leadership programs of the Illinois Mathematics and Science Academy. In particular, the paper will discuss IMSA's venture into video production and their journey from novice to professional programming

History

The Illinois Mathematics and Science Academy was developed by the Illinois State Assembly and former Gov. James Thompson as part of the educational reform package in Illinois. The original concept was created from a curriculum design workshop convened in 1983 by Dr. Leon M. Lederman, then the Director of Fermi National Accelerator Laboratory in Batavia, Illinois. The Illinois General Assembly established the academy through Senate Bill 730 and IMSA opened their doors September 7, 1986.

The academy started with, "210 students, 12 faculty members, nine resident counselors, 21 courses, no residence halls, no computers, no library books, limited funding and an uncertain future" (IMSA, 1993, p. 4). The Illinois General Assembly aided the academy with further funding to insure growth and stability. The Illinois Mathematics and Science Academy is governed by an appointed Board of Trustees and is required to submit budget requests to the Illinois Board of Higher Education.

The Illinois Mathematics and Science Academy's first class graduated and 629 students currently attend the academy. IMSA is also conveniently located 35 miles west of Chicago along the Illinois Research and Development Corridor, enabling students to interact with some of the world's leading scientific, research and educational innovators.

Academic Program

Curriculum

The academy's academic program offers courses in mathematics, science, art and humanities. Courses emphasize interconnection between and among the various disciplines. Courses are prescribed for sophomores, juniors take a combination of prescribed and elective courses and seniors design an all-elective schedule based on individual interest and graduation requirements. Example of courses are: Facts of Thermodynamics, Pathogenic Microbiology, Differential Equations, Concert Band and Physical Education: Lifetime Activities.

in June of 1989 and the academy's environment had increased a great deal. By 1989, IMSA had 55 faculty members, 22 resident counselors, 127 courses, five completed residence halls and two under construction, approximately 20,000 library books, 300 computers, an impressive record of student achievements and a collaborative outreach program.

Tuition and most board expenses are provided by the state of Illinois. The approximate cost per student is $15,000

Assessment

Neither grade point averages nor class ranking are used at the Illinois Mathematics and Science Academy. Instead. Teachers have developed assessments which require students to use information in contexts similar to those they will encounter as professionals. These assessments consist of: performance analysis, thinking logs, learning journals and portfolios.

Schedule

A unique academic schedule features Exploration Days (every sixth school day) instead of regular classes. Students participate in independent and group research, special seminars and symposia, academic field trips and mentorships with industry. The students do not attend classes on the weekends. The academic schedule rotates through the week which keeps the students actively involved in their schedule.

Requirements

Students must earn 16 academic credits to graduate from the Illinois Mathematics and Science Academy. These 16 credits consist of: 8 in Science and Math, 2.5 in Social Science, 3 in English, 2 in Foreign Languages and .5 in the Fine Arts. Further requirements of IMSA students are: two semesters of physical/health education, 80 hours of community service, 300 hours of campus work service and they must pass the Illinois consumer education exam.

Faculty

The Illinois Mathematics and Science Academy conducts national searches for exemplary faculty and staff. The average teaching experience is approximately 13 years and nearly 30% hold Ph.D.'s. The faculty includes several Presidential Award winners, noted authors, fellowship recipients and a full-time resident scientist (IMSA, 1993, p. 7).

Information and Communications

IMSA combines the resources traditionally found in academic libraries, computer centers and audio/visual services into a single, integrated information and communications system. Their current resources include: 27,000 monograph volumes, 150 periodicals, on-line and CD-ROM data bases along with automated retrieval systems. There are also more than 500 micro-computers with access to local and wide-area computer networks, the Toyota Video Production Laboratory, a 750 volume curriculum-based video collection, satellite-based communications and a tele-communications instructional consortium classroom.

Admissions Procedures

Recruitment

The academy actively seeks out potential students through outreach programs such as the IMSA Challenge, The Early Involvement Program and by direct presentations to students.

Application

Students must be residents of Illinois and at grade 9 level of education to apply for admission. Potential students are required to fill out an application form which must include: evaluation letters from math, science and English teachers, evaluation letter from a counselor or the principal, three previous years of grade reports, current academic year SAT scores and a possible interview with an admissions review board.

Selection

A three member board of educators and professionals review each application. The selection is based on potential for mathematical and scientific reasoning, communication skill, interpersonal skills and skill application. The board looks for exceptional individuals who may or may not have high grades. There is a waiting list and those students denied admission can appeal for a review of their application. IMSA is also involved with sharing information with teachers as well as students through their StateWide Leadership Programs. Further infromation on these programs can be obtained by contacting the Illinois Mathematics and Science Academy.

StateWide Leadership Program

IMPACT II

This group is a teacher-to-teacher network to enhance mathematics and science education in Illinois.

IMSA Leadership Conference

Regional working conferences focus on understanding and using the critical state and national reports shaping change in mathematics and science education.

Project A.S.S.I.S.T.

This program consists of workshops based on superconductivity for secondary schools.

IMSA Challenge Program

This outreach program takes place in the summer and recruits minority students from across the state of Illinois in grades 7 through 9. Students participate in problem solving activities and live on campus for one week.

District Learning Leadership Teams

These are thirty Illinois school district teams that develop, implement and evaluate curriculum, instructional strategies and assessment procedures.

These various outreach programs exist to meet the goals set forth by IMSA's mission statement. The academy must share their findings with other educational institutions in Illinois. This is one of the main reasons the Illinois Mathematics and Science Academy was created and why it continues to survive. IMSA accomplishes this goal through these direct experience outreach programs and with the use of video production.

Toyota Video Production Laboratory

The Video Production Laboratory was developed in 1990 with limited equipment. In 1991, Toyota donated a large sum of money to build a fully operational laboratory. The Toyota Video Production Laboratory was created with three main functions in mind. One, create videos to share IMSA findings and activities with other educational and industrial institutions in Illinois. Two, expose young Illinois students to advanced media technology which would allow them to express ideas through visual sources. Three, support student and staff development through media technology such as the telecommunication instructional consortium classroom and distance learning.

Facilities

Television Studio

The set consists of standard features of furniture and background as well as a fully equipped lighting grid. There are two HI-8 mm cameras which can become mobile for field shooting.

Production Control Room

This area contains: a 3/4" A-B roll edit suite with two time base correctors, a video toaster which is used as a switcher, character generator, animator and special effects machine. There is also one 1/2" "cuts only" edit suite with kyron machine.

Audio Production

This area is a part of the production control room and consists of: dual cassette deck, CD player, reel-to-reel tape machine, microphone inputs MIDI sequencer and a sixteen source sound board.

All the equipment is in good shape and produces above average videotape. The equipment is in need of some upgrading to increase the quality to higher broadcast abilities. However, this lab is in constant use and growing every year.

Office of the Alliance

The Office of the Alliance is responsible for conducting a majority of the outreach programs at the Illinois Mathematics and Science Academy and has been the most active in producing videos for distribution. This department hires consultants to produce and direct video projects which are shared with other educational institutions in Illinois.

The Journey

In the beginning

The Office of the Alliance utilizes videos to meet one of the major goals of IMSA's mission, which is to share information with other educational institutions in Illinois. In the beginning, this goal was accomplished by merely recording events and sending video copies of the event to various educational communities in Illinois. This was and is currently being done to allow people that could not attend the event a chance to share information from the event by viewing the video.

An example of this event driven video program is the Dr. Edward Teller Leadership Lecture (Layng, 1992a). It is an hour long "talking head's" format video program capturing the special and rare event of a lecture by a famed physicist as well as Atom bomb co-creator, Dr. Edward Teller. This video was produced for archival purposes and has been extremely useful in sharing information but the program has a tendency to drag a bit. There is a strong desire to improve production and visual quality of future projects by producing more original programs and less event driven videos.

The Next Step

The Illinois Mathematics and Science Academy's next move on their journey into video production was to create a series from the 1993 Leadership Conference (Layng, 1993b). The video program was still event driven but now an introduction, credits, cut-ins and cut-aways of the audience picked up the pace of the video and made it more interesting to watch.

The Evolution Continues

The evolution of IMSA's use of video continued with another project called the 1992 Summer Challenge program (Layng, 1992b). IMSA students shot video of minority students, grades 7 - 9 from across Illinois, participating in a week long problem solving activity. The project consisted of editing over forty hours of footage into a one hour overview program. The video was produced with stand-alone units that made up the whole program. These units can be displayed separately to explain a specific point about problem-based learning. This video was also event driven but now IMSA was producing more material rather than just recording it.

The Original Programming Step

The Illinois Mathematics and Science Academy currently has reached the point of producing original programs scripted, shot and edited at the Toyota Video Production Laboratory. The result of this venture is a one hour interview format program called, "Jane's Baby - An Ill-structured Problem" (Layng, 1992a). The program is an informational tape on problem-based learning and uses footage of problem-based learning in action at a conference. IMSA has arrived at the stage of producing original programs that are not event driven.

The Journey Continues

The Office of the Alliance and other departments at IMSA are currently working on original programming to be distributed across Illinois. The Admissions office is producing a video tape on what it's like to be a Illinois Mathematics and Science Academy student and there are plans to send it to incoming students. The Alliance department is in the process of designing an interactive training program on problem-based learning from video generated at the 1993 Summer Challenge program.

Conclusion

The Illinois Mathematics and Science Academy is an innovative educational institution with unlimited possibilities. One of these possibilities is the increased use of visuals to share information and aid students in their quest to better understand the world.

Carl Sagan, member of IMSA National Advisory Board, described IMSA's impact on society best by saying, "Our future depends on producing and encouraging highly competent, ethically responsible young scientists, as well as much greater scientific literacy in the general public. The Illinois Mathematics and Science Academy in Aurora, Illinois, is dedicated to meeting this challenge... It is the gift from the people of Illinois to the human future" (IMSA, 1993, Pamphlet).

What better way to make the public more scientifically literate than by making them more visually literate through the continued use of visuals in the classroom and in training. It is only a start but IMSA's journey into video production has proven quite beneficial and will continue to make a difference in the Illinois educational environment.

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Visual and Digital Technologies for Adult Learning

David G. Gueulette

OBJECTIVE

The primary objective of this report is to provide a rather comprehensive review of the research on applications of visual and digital technologies to adult learning and major related issues as reported in the literature from June, 1982 through June, 1992. This investigation of a decade of discussion on the uses of media for adult learning continues a collection of information that was initiated in September of 1974.

This investigation is intended to be a sequel to an earlier work: *Media and Adult Learning: A Bibliography with Abstracts, Annotations and Quotations* that reported the confluence of technology and adult learning from 1954-1974 published by Garland Publishing Company, New York in 1975, and to my previous published research on this same connection that was completed in the Spring of 1986 and published in part in: *Using Technology in Adult Education*, published by Scott, Foresman/AAACE Adult Education Series in 1986.

RATIONALE

Historically as well as currently there has been little emphasis on how to plan for, prepare, and utilize media and technology in adult education. If the use of media and technology is to be increased, adult educators must have a clearer understanding of how they may contribute to reaching educational goals and objectives. There must also be much more collaboration between adult educators and technologies.

This observation by Wes Meierhenry (1986, p. 3), a pioneer in the fields of both adult education and instructional technology, could not be stated more aptly or at a time when this important connection of methodologies is more in need of being understood and practiced. This nexus of adult learning and instructional technology is an important theme for a discussion on "visual literacy in the digital age." It is certainly time to set the stage for more collaboration between adult educators and technologies so that adult educators will have a clearer understanding of how they may reach educational goals and objectives utilizing exciting new visual and digital technologies.

This is an imperative mission given current developments in both delivery technologies and the systematic design of instruction/instructional design. Now is a most exciting and challenging time for adult educators to be exploring the new products and processes of technology; in particular those that result from visual and digital systems. There has been no time in history when the opportunities to enrich and expand our teaching/learning techniques have been more inviting. Consider the possibilities: the ubiquitous microcomputer, teleconferencing, satellites and global television, home videocassette recorders, visualization and memory technologies, or psychotechnologies. New devices and methods of instruction are in reach of adult educators and can provide, if not immediate practical improvements in instruction, then at minimum, the occasion to review their own individual teaching philosophies and methods.

We all understand the need for adult education practitioners and planners alike to be aware of the compelling technologies now at hand and to assist them in their selection or rejection of these systems. Not all will wish to mechanize or systemize their instruction and these choices are also appreciated. It is unlikely that those who advocate the use of instructional technologies would promote systems at the expense of the individual's right to make personal decisions regarding teaching style. Even the most technology-directed advocate of using systems could not verify that new methods are always better than traditional or conventional lectures, discussions or written exercises. Research on comparisons of mediated vs. non-mediated instruction in the last forty years has just not sustained that position. Thus, it is in the spirit of offering information, ideas and a context for the use of new and long-standing technologies alike that these findings from the fields of both adult education and instructional technology are presented.

New items identified and documented through this research augment the on-going collection and provide more timely data on the recent applications such as local area networks, instructional satellite systems, and hypermedia, all of which have visual and/or digital components. The emergence of these new media and delivery systems suggests significant instructional innovation and provides a strong rationale for investigating the topic; however, the presence of issues related to using media for adult learning also necessitates the review. Questions regarding the costs, failure of equipment, inadequate pedagogical bases for applications, improper or unethical uses, and societal impact of technology have become major issues that must be considered as well.

This suggests that it is important to assess not only the impact of specific connections of media to teaching, but to evaluate the over-all percussion of new technologies as they come up against conventional teaching/learning models. Reports on new media provide key information for investigating the field, however, current issues related to using mediation for adult learning are also in review.

Perhaps the most significant aspect of this report may be the investigation of, and improvement in, an understanding of the ways in which published reviews of media uses for adult learning inform the practice of adult education. And, in a similar vein, how adult education activities as described in print constrain or expand the ways instructional media are employed.

It is the interplay of adult teaching/learning and visual and digital technologies that is of paramount interest; and, how the reportage of such events, in a reflexive way, conditions further reciprocal actions. It has been determined in my earlier studies that this reciprocity of effect has driven both fields in both positive and negative directions.

This relationship continues; and, in fact, has become more intense. I believe that it is important for both fields to have a sense of this connection and how the diffusion of information on applications brings about certain additional instructional developments. Unquestionably, both fields benefit from a more complete picture of this correlation. Successful uses of media for adult learning become evident and can serve as models for either or both areas. Likewise, those findings that show negative or limited value can be identified and, possibly, subsequently be used to constrain some activities.

The themes of the conversation regarding the findings are: what applications are most evident, and why are certain categories of media ascending in use, what are the most common uses of the visual and digital for adult learning, and why do some media appear to be not widely reported or ignored.

The summary will assess the applications to determine if it is possible to develop some useful generalization concerning future connections of instructional technology to adult learning. Adult learning in training, higher education or other learning environments is increasingly becoming the focus of mediated instruction. Thus, it is appropriate that the best uses of the media for adults be identified and that those cases be disseminated and modeled.

METHODOLOGY

As a result of two very extensive Educational Resource Information Center (ERIC) searches using 162 descriptors, I have identified 7144 potential entries on the applications of media for adult learning as compiled in that data base. There is a substantial number of interesting new visual and digital descriptors for locating the data which include terms such as: personal computers, microcomputers, teleconferencing, telelearning, videotext, databases and some quite recent terms such as: compressed video, CD-worm, digital video interactive, and others.

These descriptors were instrumental in identifying the literature that provides the basis for determining trends in the use of media for adult learning and tangential issues. This very large number of descriptors unearthed the extensive collection of articles, research reports and studies that constitute this nexus of media and adult learning.

Searches through the Northern Illinois University Founders Library and the associated on-line library network have provided more helpful publications that have added to this collection and thus have been included in the review.

A systematic review of the INDEXES, ABSTRACTS AND SERIAL BIBLIOGRAPHIES IN THE N.I.U. LIBRARY focused on the following areas:

American doctoral dissertations
Dissertation abstracts international
Index to U.S. Government periodicals
Newspaper index
Book review index
Library journal book review
Technical book review index
International index to film periodicals
Language teaching
Current contents: social and behavioral sciences
Social science citation index
Social science index
Communication abstracts
Index to journals in communications studies
British education index
Canadian education index
Sociology of education index
Human resources index
Information science index
Library and information science abstracts
Computer abstracts
Computer literature index
Computing reviews

This review was very time consuming and was not as rewarding in generating useful items as were the ERIC searches which, in fact, yielded almost all of the same publications.

Published reports were examined from:

Clearing House for Federal,Scientific and Technical Information
Library of Continuing Education
National Institute of Education
National Multimedia Center for Adult Education
Xerox University Microfilms

All ERIC abstracts, new published texts, annotations and published reports were examined and appropriate items sorted in or out.

As noted earlier, 7144 publications were captured that contained the descriptor ADULT EDUCATION. This term is the constant in my review of databases and all other publications. The descriptor ADULT EDUCATION, was combined with 162 other single term descriptors from the ERIC Thesaurus that suggest visual or digital technology applications. While this selection of technology terms may not include all possible words that could be broadly construed to reflect a media or technology association, this collection of descriptors is highly representative of the field of Instructional Technology and as comprehensive as practicable.

The connection of the term ADULT EDUCATION to the 162 technology terms yielded some very interesting quantitative discoveries. While it is informative to examine the extent of combinations, it is not useful to exaggerate the importance of simply counting associations. Noting the extent of the use of media for adult learning that is mentioned in the literature does not shed much light on some of the concerns that have been raised regarding the appropriate use of technology or the cost factors or effectiveness of emergent media. However, that noted, a look at the big picture of how much and what types of technologies are being used for adult education as noted in publications is very useful as a means of assessing the general magnitude of applications and current and future directions.

Another concern that must be raised with this type of research is that it does not necessarily reflect reality. While, for example, we find that the overhead projector and transparency do not figure large in the literature of this review, many surveys of adult learning environments have found that this medium is widely and intensively used in virtually all adult education environments. Common sense and observation support this point. So, it would be an error to assume that because we have very complete data on the nexus of adult education and technology terms as it appears in the literature, that this alone gives an accurate and complete picture of the uses of media for adult learning.

Given these two very serious limitations of a review of this sort, what then is the merit of such a critique. This snapshot of the field is especially valuable if it is compared against earlier similar data so that it may be possible to observe and evaluate trends in media use or the expansion or diminution of particular applications.

There is the argument that the literature reflects experimentation and investigation of ideas and applications more than simply reporting on traditional and successful and practical pedagogical techniques. An analysis of the literature yields more on the directions of uses and the successes and failures of new ideas and activities than assessments of more conventional mediations.

With this framework, then, it is useful to share some of the quantitative results of the combining terms methodology employed in this investigation.

DISCUSSION

Of the 7144 items that the descriptor ADULT EDUCATION yielded in this review, 581 were connected with the very broad descriptor, TECHNOLOGY. This association is without question the most frequently observed. The term TECHNOLOGY is so broad that it can encompass practically any kind of electronic, mechanical or hardware/software supportive instructional resources. It is not surprising that this descriptor is the most commonly found constituting 8 percent of the total of ADULT EDUCATION connections.

At 338 connections the term INSTRUCTIONAL MATERIALS is also so broad as to be found in a substantial number of reports. The term can have a wide range of meanings, and can include almost any kind of software from handouts to videocassettes. Likewise the term MEDIA is very inclusive and, not surprisingly, is found with 296 reports.

DISTANCE EDUCATION is cited in 286 publications, and while it can include a variety of delivery techniques from correspondence education via postal services to sophisticated interactive full motion video, nonetheless, it seems safe to say that this represents the most commonly noted mediated instructional approach for adult learners.

The term COMMUNICATIONS, also a very broad term that can specify either technological or human exchanges, is associated with 211 articles. PROGRAMMING with 168 intersects can have multiple meanings that are related to technology such as developing the operating activities for computer software to non-technology endeavors such as providing staff development.

The next three descriptors: C.A.I. (COMPUTER ASSISTED INSTRUCTION) at 166, COMPUTERS at 148 and MICROCOMPUTERS at 133 cluster together and suggest that at minimum about 2 percent of all reports mention a computer application.

MATERIALS DEVELOPMENT at 137 and EDUCATIONAL RESOURCES at 128 do not suggest much as these terms also are extremely vague with multiple and varied meanings. EDUCATIONAL TECHNOLOGY at 122 also indicates only a very general association of ADULT EDUCATION and some not well specified types of mediation.

However, E.T.V. (EDUCATIONAL TELEVISION) is a great deal more specific in its meaning and at 90 connections provides a better picture of mediation than several of the previous terms. E.T.V. figures in about .125 percent of the literature. TELECOMMUNICATION at 85 and TELECONFERENCING at 64 connections respectively suggest nominal activity.

INSTRUCTIONAL DESIGN with 77 references is also just barely noticed in the survey as is COMPUTER ORIENTED PROGRAM with 75. MASS MEDIA is at 59 and COMPUTER LITERACY at 58 both terms yielding a very tiny percentage of the total field.

DATABASE is also a descriptor with multiple and thus imprecise meanings and at 56 hits does not say much about the magnitude of use in adult education situations.

SIMULATION at 55 is a term with both technology and non-technology meanings. For example it can be either interactive computer software that creates a life-like environment or games that involve only people interacting with each other.

At 50 associations, TELECOURSES is a fairly specific term that indicates there is at least some reporting of the application of television to adult learning in organized courses.

AUDIO in its various forms occurs 49 times in the survey. INFORMATION NETWORKS, that is formal or informal systems of exchanging information in electronic or other means, appears 46 times. The descriptor FILMS shows up in 43 instances and MEDIA SELECTION associates with 43 items as well.

COMMUNICATIONS SATELLITES connects with 31 ADULT EDUCATION reports while C.M.I. (COMPUTER MANAGED INSTRUCTION) joins with 23.

TELEPHONE INSTRUCTION makes a juncture with 6 items, TOYS with 5 and FACSIMILE TRANSMISSION with only 1.

One can make some interesting observations or assumptions regarding the degree of occurrence of junctures as noted from this review. The combined total of all technology related descriptors that connect with ADULT EDUCATION is 4716. Of course, there would be many overlapping uses of terms in reports. A case in point, a report on using TELECOURSES for ADULT

EDUCATION would almost certainly also employ words such as DISTANCE EDUCATION or EDUCATIONAL TELEVISION. Of the descriptors selected for this study there are many that appear frequently together.

Still in all, it is interesting to note that of the 7144 items investigated technology citations appear 4716 times. It is not useful, however to make much of the fact that these 4716 descriptors represent 66 percent of 7144, the total of ADULT EDUCATION references. There is no way of knowing from this study the exact number of items that mention ADULT EDUCATION without reference to one or more of the technology related terms. Therefore, it is impossible to suggest with any confidence the number of cases where some sort of mediation is used as compared to the number where no mediation or technology is reported. One day it may be possible to sort out this relationship.

It is not surprising to find 286 DISTANCE EDUCATION connections. Lately professional journals and conference presentations are focusing on the increasing attention being paid to delivering adult education via electronic means over distance or barriers. The 6 associations with TELEPHONE INSTRUCTION seem somewhat low given that this method of instruction is often found with distance delivery schemes. But, perhaps, like the ubiquitous OVERHEAD PROJECTOR, telephone instruction is just accepted as normal and not given much attention in the literature.

References to television or video in all its forms, E.T.V., VIDEOTAPE CASSETTES, COMPRESSED VIDEO and so on do not show up as much as common sense and observation tell us they should. Very likely these applications suffer neglect in the literature as well. In the earlier studies in this series, television with fewer related descriptors appeared much more often as compared to the total number of ADULT EDUCATION items. This is also true for COMPUTERS with related descriptors. The last review of the literature completed in 1984 revealed significantly more connections of both television and computer related descriptors as compared with a set of items with the descriptor ADULT EDUCATION only half as large.

It is not so much that our collective interest in these technologies is dwindling as there is a great expansion of many other topics or ideas that are being explored. Reports on visual and digital technology applications seem to be increasing arithmetically, while the number of articles on various and diverse other topics in the field of adult education is growing geometrically.

And, the relatively small number of reports on technology may reflect a growing acceptance of these methods for solving instructional problems. This acceptance might be shielding examples of mediating instruction for adults from scrutiny in the journals.

It is heartening to find increasing references to INSTRUCTIONAL DESIGN and ADULT EDUCATION, as a good deal more attention to organizing and systematizing instructional experiences for adults is called for. This connection has been slow in coming forth. The descriptor did not appear at all in the first study of the field and then only nominally in the second inquiry. The resistance to instructional design that appears to have characterized preceding decades is probably being overcome by young adult educators who draw upon exposure to and success with this powerful technology.

One might also expect the descriptor FAX to emerge in new reviews. Interestingly, the term FACSIMILE was noticed in the first survey, did not appear in the second, now has emerged once more.

Another surprise was the unexpected 5 findings of the term TOYS associated with ADULT EDUCATION. An examination of the articles did not uncover a pattern of using toys for adult learning, but rather random applications for special adult learners and as a connection with games and for assessing toys in general as educational appliances.

The lack of citations for the descriptors CD WORM, AUTHORING SYSTEMS, COMPUTER HYPERMEDIA SYSTEMS, COMPRESSED VIDEO and DIGITAL VIDEO INTERACTIVE and other new terms is somewhat perplexing and disquieting. One would hope to find some references to these new and exciting technologies. The fact that descriptors for some of the very newest systems do not connect with ADULT EDUCATION must raise a question concerning the willingness of the field to consider the most current and potentially effective media.

Seven to ten years from now, a similar review might add to the longitudinal data already compiled. While it is not possible to derive any significant generalizations from the quantitative findings, it is useful to assess the direction and magnitude of the literature that is the nexus of ADULT EDUCATION and TECHNOLOGY.

THE SEARCH

ADULT-EDUCATION	7144
TELEPHONE-INSTRUCTION	6
TELECOURSES	50
TELECOMMUNICATIONS	85
TELECONFERENCING	64
DIAL-ACCESS-INFORMATION-SYSTEMS	0
PUBLIC-TELEVISION	8
CABLE-TELEVISION	15
CATV	0
CLOSED-CIRCUIT-TELEVISION	5
COMMUNICATIONS-SATELLITES	31
EDUCATIONAL-TELEVISION	90
TELEVISION-RESEARCH	5
TELEVISION-CURRICULUM	1
TELEVISION-VIEWING	11
MICROTEACHING	5
BROADCAST-TELEVISION	9
COMMERCIAL-TELEVISION	1
COLOR-TV	0
TELEVISION-COMMERCIALS	0
BROADCAST-INDUSTRY	6
BROADCAST-RECEPTION-SYSTEMS	0
BROADCAST-RECEPTION-EQUIPMENT	0
PROGRAMMING	168
COMPUTERS	148
DIGITAL-COMPUTERS	1
CYBERNETICS	0
COMPUTER-GRAPHICS	8
INPUT-OUTPUT	4
INSTRUMENTATION	8
DISPLAY-SYSTEMS	0
MINICOMPUTERS	0
MICROCOMPUTERS	133
PERSONAL-COMPUTER	0
VIDEO-EQUIPMENT	10
VIDEOTAPE-CASSETTES	7
VIDEOTAPE-RECORDINGS	37
VIDEOTAPE-RECORDERS	2

VIDEODISC-RECORDINGS	2
AUDIOGRAPHIC-CONFERENCE	0
AUDIO-TUTORIAL-INSTRUCTION	0
CD-WORM	0
COMPUTER-HYPERMEDIA-SYSTEM	0
COMPUTER-CONFERENCE	0
COMPRESSED-VIDEO	0
COMPUTER-MULTIMEDIA-SYSTEM	0
COMPUTER-NETWORK	0
DIGITAL-VIDEO-INTERACTIVE	0
PERSONALIZED-SYSTEM-OF-INSTRUCTION	5
PROGRAMMED-TUTORING	0
SUGGESTIVE-ACCELERATIVE-LEARNING-AND-TEACHING	0
TELECTURE	0
VIDEO-TELECONFERENCE	0
AUDIO-TELECONFERENCE	0
AUTHORING-SYSTEM	0
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COMPUTER-PROGRAMS	14
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AUTHORING-AIDS	0
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COMPUTER-ASSISTED-INSTRUCTION	166
COMPUTER-BASED-INSTRUCTION	0
COMPUTER-MANAGED-INSTRUCTION	23
COMPUTER-ASSISTED-CLASSROOM-LABORATORIES	0
COMPUTER-ASSISTED-LABORATORY	0
COMPUTER-LITERACY	58
AUDIO	49
EDUCATIONAL-MEDIA	46
MEDIA	296
MASS-MEDIA	59
MEDIA-SELECTION	43
MASS-MEDIA-TECHNOLOGY	0
MEDIA-TECHNOLOGY	0
MEDIA-&-TECHNOLOGY-FOR-HUMAN-RESOURCE-DEVELOPMENT	1
MULTIMEDIA-INSTRUCTION	1
COMMUNICATIONS	211
ELECTROMECHANICAL-TECHNOLOGY	6
TECHNOLOGICAL-ADVANCEMENT	0
TECHNOLOGICAL-LITERACY	9
TECHNOLOGY	581
TECHNOLOGY-TRANSFER	34
EDUCATIONAL-INNOVATION	69
EDUCATIONAL-EQUIPMENT	7
EDUCATIONAL-TECHNOLOGY	122
ELECTROMECHANICAL-AIDS	1
ELECTRONIC-EQUIPMENT	8
VISUAL-LITERACY	5
MAN-MACHINE-SYSTEMS	5
AUDIOTAPE-RECORDERS	2
AUDIODISC-RECORDINGS	0
TAPE-RECORDERS	0
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INFORMATION-SERVICES	39
PUBLIC-HOTLINES	0
INFORMATION-PROCESSING	12
INFORMATION-THEORY	1
INFORMATION-SOURCES	59
INFORMATION-NETWORKS	46
ONLINE-SYSTEMS	12
AUDIO-EQUIPMENT	1
AUDIODISK-RECORDINGS	0
AUDIOTAPE-RECORDINGS	8
AUDIOTAPE-CASSETTES	4
MAGNETIC-TAPE-CASSETTES	2
MAGNETIC-TAPES	3
TAPE-RECORDERS	2
INSTRUCTIONAL-SYSTEMS	6
INSTRUCTIONAL-DESIGN	77
INSTRUCTIONAL-DEVELOPMENT	36
SYSTEMS-APPROACH	38
SLIDES	22
SLIDE-PROJECTORS	0
PHOTOGRAPHY	10
ANIMATION	5

FILM-INDUSTRY	0
FILMS	43
INSTRUCTIONAL-FILMS	8
SINGLE-CONCEPT-FILM	0
PROJECTION-EQUIPMENT	4
ELECTRONIC-CLASSROOMS	1
LANGUAGE-LABORATORIES	1
TEACHING-MACHINES	1
INDIVIDUALIZED-INSTRUCTION	109
INDIVIDUAL-INSTRUCTION	15
AUTOINSTRUCTIONAL-AIDS	26
PROGRAMMED-INSTRUCTIONAL-MATERIALS	15
PROGRAMMED-INSTRUCTION	7
CALCULATORS	3
EDUCATIONAL-GAMES	15
SIMULATION	55
COMPUTER-SIMULATION	5
MICROGRAPHICS	0
MICROPHOTOGRAPHY	0
MICROFILM	3
MICROFORM-RECORDERS	0
MICROFORM-READERS	0
MICROFORMS	0
MICROFICHE	15
COMPUTER-OUTPUT-MICROFILM	0
VISUAL-AIDS	13
INSTRUCTIONAL-AIDS	0
MATERIAL-DEVELOPMENT	137
INSTRUCTIONAL-MATERIALS	338
EDUCATIONAL-RESOURCES	128
LEARNING-RESOURCES-CENTERS	7
LEARNING-LABORATORIES	12
OPAQUE-PROJECTORS	0
OVERHEAD-PROJECTORS	1
TRANSPARENCIES	0
FILMSTRIPS	11
FILMSTRIPS-PROJECTORS	0
NONPRINT-MEDIA	1
TOYS	5
AUDIOVISUAL-CENTERS	3
AUDIOVISUAL-AIDS	39
AUDIOVISUAL-COMMUNICATIONS	5
AUDIOVISUAL-INSTRUCTION	9
VIDEOTEX	9
FACSIMILE-TRANSMISSION	1
TELEGRAPHIC-MATERIALS	0
DISTANCE-EDUCATION	286

CONCLUSION

I have been involved in the study of the implications of using media for adults both as a continuing research interest and teaching activity for all of my professional life. It seemed appropriate to update the media and adult learning studies of 1975 and 1986 to maintain my own knowledge in the field and also to provide this information to students and colleagues.

The results of this inquiry are being used in courses at Northern Illinois University: Instructional Technology Administration, Instructional Technology Survey, Instructional Technology for the Future, and Media for Diverse Cultures.

The findings are serving as a basis for several articles in professional journals and for presentations at the American Association for Adult and Continuing Education Conference in Dallas, Texas, November of 1993 and the Association for Educational Communications and Technology Conference in Nashville,Tennessee, February, 1994.

In particular this review may provide discussion points for those adult education practitioners and theorists who will be making decisions on the uses of visual and digital instructional technologies in our dramatically changing World of the 21st Century. While we can only guess at what the future will hold with regard to new uses of technologies for adult learning, it is probably not what we can predict with any certainty. Studies on this connection over the last twenty years support this position. It is more the limited role that the literature plays in informing practice, regrettably, than in obtaining a clearer view of the direction of applications of media. It is unfortunate to conclude that what we read and ponder from the literature at this nexus of two very robust fields provides very little guidance on either the practice or theory of adult education.

The challenge put forth by Wes Meierhenry (1986, p. 3) in the introductory section of this report that, "There must also be much more collaboration between adult educators and technologies," can not, in my view, be achieved through examinations of published materials alone. This exchange must take place in demonstrations, face-to-face discussions and lively confrontations. Mostly, however, progress seems to come about from working with each other, sharing ideas in conversations and borrowing practices from those whom we model.

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Use of Humorous Visuals to Enhance Computer-Based-Instruction

Wendy Snetsinger
Barbara Grabowski

BACKGROUND:

According to Hill (1988), "One of the most important functions of humor (in the classroom) is to create a positive learning environment...When students can relate what they learn to a memorable context, whether it is visual or emotional, they are more likely to remember the information. Using jokes and anecdotes to enhance stories provides such an association." (p.20). Keller and Suzuki (1988) state in their ARCS Motivational Model that gaining and maintaining attention of the learner is the first principle for developing motivation in a lesson.

Some research has been conducted on the use of humor in the classroom and in business settings. It has been used as a motivational objective and as an enhancement to learning and retention (McGhee, 1980; Zemke, 1991; Ziv, 1979, 1988a, 1988b); however, no investigations have focused on these issues in computer-based-instructional material.

What is humor? And what is it to be humorous? McGhee (1979) traces the Latin term "humor" to ancient, medieval and Renaissance physiology when it referred to one of four bodily fluids associated with temperament. To be in a "good mood" meant the fluids were balanced; otherwise, one would be "out of humor". (p.5) Later the term "humorist" was applied "to anyone who was highly skilled at producing amusing, incongruous, ridiculous or ludicrous ideas and events." (p.5). Freud believed humor to be important as a coping mechanism. (MacHovec 1988). He further maintained that humor permitted adults to enjoy a childlike release from societal restrictions on behavior. (Keith-Spiegel, 1972). Sorrell (1972) states "laughter lifts man above his animalistic state, sets him free, and gives his spirituality another dimension." According to MacHovec (1988) humor is a universal characteristic.

From ancient to modern times, regardless of culture, religion, geographic location, language, ethnic identity or gender, laughter is a [illegible] of everyone's experience. MacHovec (1988) calls it "a complex psychological-emotional phenomenon." (p.3). Although what is considered funny for one person or group may not be so for another, still there are classic stories and situations that transcend cultures and time.

The effects of humor as a form of mass audience appeal has been seen in television programming. The effect, besides entertainment, is that humor serves as a diversion from everyday problems, a relief from frustrations and boredom. Most particularly, humor is exploited for its "drawing power." (Brown and Bryant, 1983).

In an effort to attract audiences, children's educational programs, such as "Sesame Street" and "The Electric Company" incorporate humor and elaborate visual effects. Many techniques are inspired by "MTV" or pinball arcades. Wakshlag, Day and Zillman (1982) investigated the amount and distribution of humor used in educational programs and how children select one program over another. The conclusions were that both boys and girls chose humorous educational programs over non-humorous educational programs when they were free to choose what they watch.

There is a risk in exploiting humor in educational programming. It could interfere with cognitive processing of the serious portions of the material because the viewer may not put in the mental effort required to encode facts and concepts. However, Zillman and Bryant, (1983) report that "based on Freudian reasoning, humor has been expected to alleviate tensions and anxieties; consequently it should relax students who are uptight about exams and improve performance." (pp. 177-178) But these data are inconclusive.

Bryant, et al. (1980) reviewed the literature on how humorous illustrations in textbooks affected information acquisition, appeal, persuasibility and motivation. Their conclusions were mixed. Texts were considered to be more enjoyable with humor incorporated. However, the educational value was not demonstrated to have been significant. Indeed, humorous illustrations had the potential of impairing the persuasiveness of certain arguments.

Fleming (1966) rationalized that humor in pictures and text can aid in developing positive attitudes and learning in students of modern languages, much like political cartoons can "sway an entire election campaign." However, he did not test his theory.

Ziv (1988a) found significant differences in favor of learning with relevant humor compared to no humor in two studies of university students (the second replicated the first). In each case his research was based on one-semester courses as opposed to studies by others whose experiments ranged from seven minutes to one hour.

Gruner (1970) and Markievicz (1974) found that although attention and interest in a particular topic is enhanced with humor, comprehension and acceptance of a message were not. Hauck and Thomas (1972) found with elementary school children there was an increase in recall of incidental but not intentional material. Clabby (1979) found intentional learning among "low creative" students to be significantly higher using humorous captions.

Weinberg (1976) found no difference for comprehension and retention of adjacent material where humor was mixed with serious examples. Bryant et al. (1980) had similar results in textbooks using humorous illustrations. However, Weinberg (1976) found that humorous material seemed to help the "brightest and least anxious students but acted negatively for less able and more anxious." (p.84). Kaplan and Pascoe (1977) found overall test performance of university students was not significantly different between humorous treatment and serious treatment groups, but there was better recall of humorous examples.

Powell and Andresen (1985) reviewed more than 50 papers speaking to the value of humor, but there have been few empirical studies conducted to verify the results. One of the qualities students would most hope to find in their teachers is humor. Ziv (1979) concurs that humor plays a significant role in creating a positive class atmosphere.

Zigler, Levine and Gould (1967) studied the cognitive "demands" of humor on children. They suggest that there is much gratification in the cognitive process involved in responding to humorous stimuli. There is a sense of achievement by "seeing the joke" This suggests an intrinsic motivation for humor in learning.

Davies and Apter (1980) studied 285 primary grade school children who were shown a series of tape-slides. The material incorporating humor resulted in the greatest retention of information. In a similar experiment with university students conducted by Clark (1983) the results did not indicate any effect on retention. However, the humorous material was rated for "liveliness", which may be a factor in reducing boredom.

According to Herbert (1991) humor can be categorized into four functional groups—psychological, sociological, physiological and educational (communication value.) The use of humor to create a friendly, pleasant environment in which to learn through computer-based instruction and how humor may enhance the learning experience is the basis of this investigation.

It is our hypothesis that a visual strategy which incorporates a humorous theme and cartoons with humorous comments relevant to the content will help motivate students to attend to the material, provide a warm environment and aid in encoding facts and concepts better than material presented in a standard, non-humorous way.

THE STUDY:

An experiment to assess this hypothesis was recently undertaken at a large eastern university. The study tested the effects of a CBI science lesson that incorporated a humorous theme (Fig. 1), cartoons and animation with a CBI science lesson presented in a traditional manner with no humor. (Figs. 2-3)

The topic of the science lesson, "Anatomy of the Hard Tick," was selected on the basis of a growing health problem in United States—Lyme disease, which is caused by a particular species of tick. In order to diagnose Lyme disease correctly, it is necessary to accurately identify ticks to species. The tick anatomy lesson is part of a complete computer-based courseware package being developed at Penn State.

Humor in this study was defined as: The use of a theme that is ridiculous and exaggerated based on a parody which combined a familiar Charles Addams-like cartoon with a Dracula-type character (Fig. 4); content material presented in a lighthearted manner, rather than a facts-only scientific style; inclusion of whimsical cartoons (Fig.5) and animation; inclusion of occasional informal, conversational mnemonics as memory aids versus mnemonics given as straight memory aids.

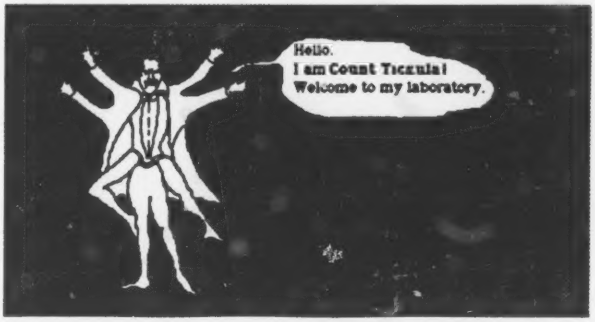

Hello.
I am Count Tickula!
Welcome to my laboratory.

FIGURE 1.
Introductory Screen from Humor Lesson

WELCOME
to
The Anatomy Lesson

FIGURE 2.
Introductory Screen from Traditional Lesson with No Humor

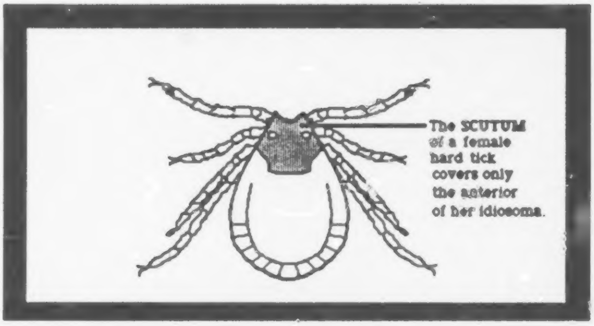
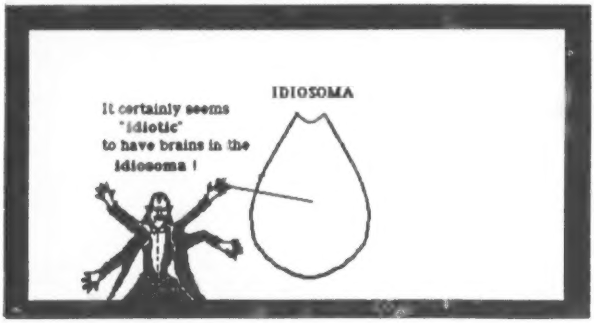
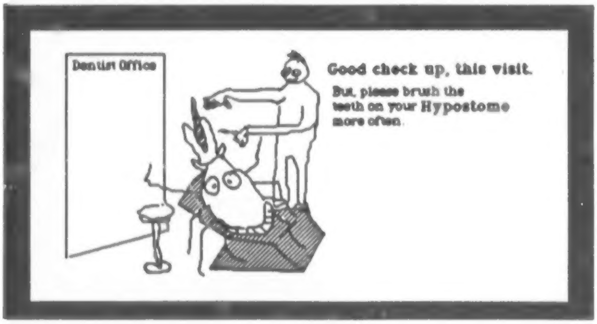

The SCUTUM of a female hard tick covers only the anterior of her idiosoma.

FIGURE 3.
Basic Information Screens Used in Both Lessons



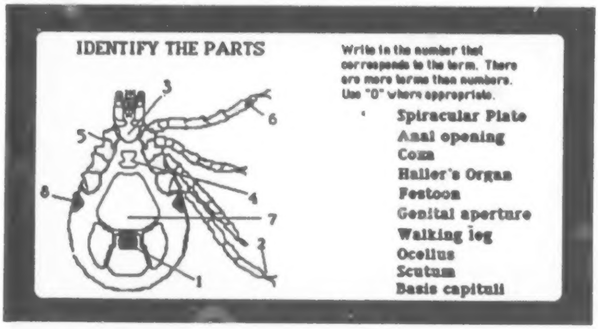
IDIOSOMA
It certainly seems
"idiotic"
to have brains in the
idiosoma !

FIGURE 4.
Screen from Humor Lesson
with Narrator Giving a Mnemonic Aid



Dentist Office
Good check up, this visit.
But, please brush the
teeth on your Hypostome
more often.

FIGURE 5.
Screen from Humor Lesson
Emphasizing the Location
of a Particular Anatomical Structure



IDENTIFY THE PARTS

Write in the number that corresponds to the term. There are more terms than numbers. Use "0" where appropriate.

Spiracular Plate
Anal opening
Coxa
Haller's Organ
Festoon
Genital aperture
Walking leg
Ocellus
Scutum
Basis capituli

FIGURE 6.
One of the Screens
Used to Test All Study Participants

The computer-based instructional lesson (CBI) "Anatomy of the Hard Tick" was presented to two treatment groups. One group comprising 43 students received the lesson with the inclusion of a humorous theme and humorous comments related to the content. The second group comprising 32 students received the lesson "Anatomy of the Hard Tick" without the inclusion of any humor. A third group comprised of 40 students served as a control and received no lesson.

One week after the initial treatment, all three groups were given identical tests on factual and conceptual knowledge of tick anatomy (Fig. 6). In addition they were also given a brief survey of questions based on their college major, background experience with ticks and Lyme and other tick-borne diseases and opinions of the instructional material.

RESULTS:

Statistical one factor analysis of variance was used to determine the difference between groups in terms of total scores on the delayed post test. No significant difference was found between humor and non-humor groups, only between the control group and treatment groups. Both treatment groups were equal in terms of enjoyment of the lessons. Not surprisingly, the control group, which did not receive the lesson, measured significantly lower at the p=.05 level in enjoyment level.

A two factor analysis of variance was used to determine differences in total scores based on having been bitten by a tick or having contracted Lyme disease. The theory for these questions was that personal experience with ticks may increased interest and attention in the lesson material. However, no differences were found between those subjects who had been bitten by a tick and those who had no been bitten. None of the participants in the study had contracted Lyme disease.

Whereas certain regions of the country are more vulnerable to ticks and tick-borne diseases than others, the location of the participants' home residence did not seem to factor into the results. Also, none of the participants had associations with anyone who had been sick with a tick-borne disease.

On the affective measures, the extent to which participants were afraid of insects, spiders and ticks, no significant difference was indicated between any of the three groups. However, in terms of the degree to which subjects' were worried about ticks and tick-borne diseases, there was significant difference at the p=.05 level with the humor group being more worried.

DISCUSSION:

The results of this study indicate that there was no significant difference found between treatment strategies in terms of learning and retention. These findings are supported by Sewell (1979). His study in part compared comprehension and evaluation of five different treatment strategies including humor in the form of cartoons that accompanied textual material.

It is theorized by the authors, however, that the scientific, sequential use of graphics were sufficiently meaningful to produce highly positive results without the use of humor to enhance learning. This is useful in terms of allowing choice without compromising quality of instruction.

In terms of affective results of the study, the humor group indicated significantly more worry about ticks and tick-borne disease. This is important since being concerned about potential dangers may imply that precautions are more likely to be taken in vulnerable areas and medical advice sought, if bitten. These data also imply that another form of learning took place as a result of more dramatic reinforcement of concepts.

Questions for further research were raised as a result of the current study. Would separating the groups into different meeting times make a difference to the learning and retention outcome? During this study only one third of the subjects received humorous material at any session. However, with subjects who took the humor lesson when no one besides the author was present, there was more outer expressions of amusement observed, such as smiles and laughs. In a group situation, perhaps there is a need for a "critical mass" attending the same information to be amused.

Would treatments more diverse be a better means of assessing the effect of humor? It would be interesting to compare treatments that have a wider degree of variability in terms of graphics enhancements with or without humor and text alone without graphics but with or without humor. There is also a possible need for a warm-up to humor just as audiences receive to set the tone and stage for the big performer.

CONCLUSION:

The theory behind designing computer-based-instructional courseware with the inclusion of humorous visuals, was to attempt to recreate the warm and comfortable feeling that one might experience in a classroom with a friendly, upbeat teacher. Creating a inviting atmosphere is important for general appeal. Learners are more apt to use and enjoy computer-based instructional programs that meet individual preferences. In this way, it was thought that greater learning and retention would take place. The fact that both humorous and non-humorous groups were found to have no significant difference in test performance can be interpreted as meaning that both presentations were equally effective. Both contained clear and sequential graphics and the humorous theme and animation apparently did not enhance the learning in this study. However, the advantage of this finding is that if the subjects were given a choice of lesson approaches, the could expect to achieve equal outcomes.

The study did indicate that on the affective level, the humor group was more impacted by the dangers of ticks and tick-borne diseases, and thus may be expected to be more cautious in vulnerable outdoor locations and seek appropriate aid if bitten.

SUGGESTIONS for INCLUDING HUMOROUS GRAPHICS in CBI:

Based on the literature regarding humor and the strategies incorporated in the treatments of this study, the following guidelines are proposed for including visual humor in CBI:

* Use a humorous theme as an analogy to the content.
* Relate cartoon characters to content.
* Avoid offending through slurs or put-downs of a target group.
* Pace humor strategically throughout the lesson.
* Incorporate humorous mnemonics.
* Ensure clarity so the point is made and

humor is not lost.

* Use puns or humorous comments.
* Use humorous animation to highlight certain important features.
* Create special effects through graphics applications.
* Text can be humorous to make a point, even if the illustration is not humorous.
* Make characters lifelike and likable where appropriate.
* Use first person to give the narrator personality.
* Get serious within the context of humor by using a disclaimer.
* Use supplemental cartoons related to content.
* Have narrator introduce mnemonics as memory aid.
* Be cautious using "risque" comments.
* Use humor to point out differences.
* New characters, relevant to the theme can introduce additional facts and concepts.
* Use humor to address sensitive points or issues.
* Use a humorous announcement to do something the learner may not wish to do—like take a test.

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Affective Response to Learning via 'Visual Metaphor'

LuEtt Hanson

In the home and in the classroom, people prefer to get their information from television (Chu & Schramm, 1975; Gallup Organization, 1987; Roper Organization, 1985, 1987). Unfortunately, liking television does not always lead to learning from it. People who watch broadcast news, for example, often misunderstand or forget the information they receive (Gunter, 1987).

Perhaps people learn poorly from television because they have difficulty processing its steady stream of words and pictures. Viewers' feelings of information overload may result from the mind's limited processing capacity, from poorly constructed television messages or from both.

What is the best way to assign information to television's two sensory channels? Answers to this question have come from two sources.

Production experts usually advocate making the sound and pictures "match," without carefully defining that term (Adams, 1992; Fang, 1985; Gayeski, 1991; Whittaker, 1989; Wurtzel & Acker, 1989; Yoakam & Cremer, 1985).

Researchers studying the effects of television messages have generally found that "related" or "redundant" messages improve recognition and recall of information (Davis & Robinson, 1986; Drew & Grimes, 1987; Evans, 1985; Hartman, 1961; Hobbs, 1986; Reese, 1984; Son & Davie, 1986). The terms "related" and "redundant" again refer to some degree of audio/video match, but they lack consistent definitions.

Neither group of writers adequately addresses the problem of abstract verbal information, for which there are no "matching" or "redundant" pictures. Research to date has ignored this condition; practitioners often advise the television producer to find a way to convert an abstract subject to one that is concrete (Craft, 1992; Fang, 1985; Yorke, 1987).

Television program creators, however, often need to communicate abstract subject matter. Television's perceived inability to do so effectively may be one reason it is not more popular as an instructional medium (Baggaley, 1973).

The problem of gaining information and understanding from a complex source such as the dual channels of television can be clearly examined through the lens of schema theory.

Schema Theory

A schema is a mental construct that organizes information (Markus & Zajonc, 1985), a sort of mental file folder. Schemata consist of clusters of concepts connected by networks of relationships among the concepts (Graber, 1988). For example, the schema "government" might contain the concepts of "representatives," "voters" and "laws" connected by the relationships of "elect," "debate" and "obey."

Schemata perform a variety of functions. They direct attention to relevant information, guide the processing and storage of information in memory and assist in retrieving information from memory. They enable people to make inferences when information is missing and to generalize when information is overwhelming. In short, they provide a framework for understanding and interpreting information (Graber, 1988; Markus & Zajonc, 1985; Rumelhart & Ortony, 1977).

According to Rumelhart and Ortony (1977), an individual has countless schemata. Which schema does a person use when confronted with new information?

The theory of construct accessibility says individuals will rely on whichever mental representation is most accessible in order to interpret information (Bruner, 1957). Constructs become accessible in a variety of ways, including recency and frequency of activation and activation of related constructs (Sanbonmatsu & Fazio, 1991). This means that when people encounter new information, they are likely to seize first upon a pattern of understanding that is familiar from recent or frequent use or that seems to be "close enough" to the new information to fit. For unfamiliar information, though, the most accessible construct may not be the most appropriate. According to Markus and Zajonc (1985), "accessible information may at times activate an inappropriate schema, setting an inference process in motion that may lead to wrong conclusions" (p. 179).

Producers of informational television programs may inadvertently cause this to happen, especially when dealing with abstract topics. Having learned to use visuals that are "associated with" or "related to" the topic, and often working under deadline pressure, they may resort to visuals that are easily obtained and familiar to the audience, but likely to activate inappropriate schemata. For example, a news producer creating a story about the financial failure of an airline might accompany the story with shots of airplanes taking off and landing, perhaps even "file tape" that the news organization has shown viewers before. While the familiar pictures are easily processed and are "related to" the abstract topic of airline bankruptcy, they may evoke in the viewers inappropriate schemata of regular air travel and continuously scheduled flights, conditions which may no longer exist.

A better method is needed for structuring television messages so as to link new abstract information to familiar knowledge in a way that encourages the formation of sound schemata. The metaphor is a good way to provide such a structure.

Metaphor

In traditional studies of rhetoric and linguistics, "a metaphor is a word or phrase applied to an object or concept that it does not literally denote in order to suggest comparison with another object or concept" (Ortony, 1980, p. 69). A metaphor consists of a "topic"--the concept under consideration, a "vehicle"--the concept with which it is being compared, and a "ground"--the elements the two concepts have in common (Ortony, 1975). In the metaphor "cats are philosophers," the term "cats" is the topic, "philosophers" is the vehicle and the qualities the two are presumed to share are the ground. Although all three parts are necessary for a metaphor to be complete, in casual reference it is common to say the vehicle "*is* the metaphor" for the topic.

Ortony (1980) identifies two conditions necessary for a metaphor to exist. First, the comparison must have at least one meaning that is literally nonsensical in the situation in which it is expressed. This causes tension in the receiver of the communication. Second, this "contextual anomaly" can be resolved, the tension relieved and understanding achieved by discovering the attributes the topic and vehicle have in common. Because of the active involvement required to understand it, a metaphor is a powerful tool for capturing attention, engaging the imagination and consolidating new insight.

Proponents of metaphor as a teaching device generally believe it accomplishes its task through the process of schema restructuring or accommodation (Johnson, 1980; Norman, 1978; West, Farmer, & Wolff, 1991). The vehicle presents an already-learned schema, "which, with relatively little modification, can be used to produce a new one" (Rumelhart & Ortony, 1977, p. 132). The vivid imagery that is often associated with a metaphor is also seen as a valuable aid to both memory and comprehension (Ortony, 1975) because it provides strong cues for memory storage and retrieval (Paivio, 1979; Sticht, 1979) and concrete concepts that are easier to learn (Davidson, 1976).

Visual Metaphor

Most discussions of metaphor as a pedagogic tool assume metaphors are verbal. Can metaphors be visual as well? There is evidence to suggest they can. Osgood (1980) found that subjects draw "meaningful parallelisms . . . between perceptions in one sensory modality (usually vision) and words in language" (p. 205). Connor and Kogan (1980) reviewed several studies supporting "the view that metaphor can operate through sensory or other media as well as through words" (p. 284). Their own work with subjects who were asked to group thematically related pictures led them to conclude that "comparable cognitive processes distinguish metaphoric operations in the pictorial and verbal media" (Connor & Kogan, 1980, p. 299).

If metaphors can be communicated both verbally and visually, then a television program could present a metaphor in the audio channel, in the video channel, or in both. Or, the metaphor could be split between the channels, with the topic in one and the vehicle in the other. When the content of a program is abstract, the topic must appear in the verbal channel because it deals with concepts that cannot be communicated precisely in pictures.

Putting the vehicle in the visual channel forces it to be concrete since one can only show images of particular things, not generalities (Reichmann & Coste, 1980; Smith, Balzano, & Walker, 1978).

In order to be an effective teaching device, a visual metaphor must meet the criteria for effective metaphors in general. A recent review of metaphors in teaching (Tripp, 1990) establishes the importance of using one metaphor or a set of related metaphors systematically throughout an instructional presentation.

Paivio (1979) insists a metaphor's vehicle must be concrete in order to make it a better memory cue. Petrie (1979) recommends that a vehicle be not only concrete, but vivid. One way to ensure vividness and memorability is to choose a vehicle with characteristics quite different from those of the topic (Ortony, 1979). However, Pollio and Smith (1980) warn against using overly obscure metaphors, since a learner may not be able to make the comparison necessary for understanding. Instead, the vehicle should show material with which the learners are likely to be familiar, so as to evoke an existing schema (Arter, 1977; Reynolds & Schwartz, 1983). A good visual vehicle must have both enough difference from the topic to invite mental involvement and enough similarity to the topic to ensure a sound transfer of information.

An apt vehicle for a visual metaphor, therefore, should be consistent, concrete, vivid without being obscure, yet readily identified with the abstract topic by a novice learner. A good strategy for identifying such a vehicle can be found in the work of Lakoff and Johnson (1980).

In *Metaphors We Live By*, Lakoff and Johnson (1980) hold that our conceptions of everyday reality are defined by metaphor. For example, we think of time as money that can be "spent" and arguments as wars that can be "won" or "lost." We speak of ideas as objects that can "be put into" words, of words as "containers" for those ideas, and so forth. In many cases, we make sense of abstract ideas by metaphorically assigning them concrete physical characteristics. The "ideas are objects" metaphor is an example of this. In most cases, a metaphorical understanding of reality is so ingrained in a culture that its members no longer recognize their standard ways of speaking about concepts as being metaphors until they are pointed out.

The pervasiveness of metaphor in everyday language can provide a rich source of visual metaphors for informational television productions. The producer should study the abstract topic, identify the physical metaphor by which it is commonly understood, and provide images that embody that concrete ground.

For example, abstract financial topics such as investments are often understood through the metaphor "money is water." Phrases like "liquid assets," "cash on tap," a "drain on savings," and a "pool of funds" show how people use the concrete vehicle, water, in a variety of ways. An informational program about investment might use images of water gathering in a pool, flowing, and draining away to accompany abstract verbal explanations of the topic.

In addition to being concrete, such visual metaphors should also fulfill the requirements of vividness and comprehensibility, since they are a visible realization of a comparison that is common but not normally explicit. As indicated in the example above, they should also provide enough variety so that an informational program could use a related set of visual metaphoric images throughout without becoming obscure or boring.

A television program employing a visual metaphor should be an effective instructional tool. The concrete imagery should make the metaphor more memorable and the topic more comprehensible. Splitting the metaphor between the two channels should create a strongly unified message because the audience will have to compare the verbal and visual messages to understand the metaphor. In addition, the novelty and vividness of the visual metaphor should increase viewer interest in and appreciation for the viewing experience. While the visual metaphor should affect both cognitive and affective responses, this study focuses on the latter.

Methods

Two versions of an informational television program were created for this study. The documentary-style programs have identical off-camera narration in the audio channel and are eight and one-half minutes long. The narration explains some of the reasons U.S. health care costs are rising and describes three categories of proposals for funding health care, along with arguments for and against each type of proposal.

The traditional visuals version of the program uses images like those that might be found in typical education, news or documentary programs. The choice of images follows TV production guidelines that recommend showing associated subjects or visual padding when the actual topic cannot be shown (Millerson, 1985).

The visual metaphor version of the program uses images in a different way. Lakoff and Johnson (1980) argue that abstract concepts are "often--perhaps always--based on metaphors that have a physical and/or cultural basis" (p. 19). The major physical metaphor underlying the abstract concepts of health insurance and the payment of health care costs is "a covering that protects against unpleasant or harmful sensations." The visual metaphor version of the program includes many different images of people needing or using physical coverings to protect themselves in situations that are or could be physically unpleasant or harmful.

Subject attitudes were measured with a set of four statements to which the subjects responded on a five-point Likert scale on which "1" meant strongly disagree and "5" meant strongly agree. The four statements were:

1. I enjoyed watching the health care issues videotape.
2. I learned something from the health care issues videotape.
3. I could now explain health care funding options to someone else.
4. I would recommend the health care issues videotape to other students.

The subjects for this study were seventy-nine students in freshman orientation classes in the College of Fine and Professional Arts at Kent State University. The subjects viewed one of the two programs and responded to the attitude questions in late August through mid-September, 1993.

Results and Conclusion

Mean responses to the opinion statements stayed in the middle range with no evidence of extreme bimodal distribution. The lowest mean response was 2.33 and the highest was 3.61.

Calculation of t-tests between pairs of mean responses for males, females, and all subjects showed no significant differences in attitudes between viewers of the different versions of the program, either by gender group or for all subjects.

In a concurrent test, subjects' understanding of program content was measured with a twenty-question multiple choice comprehension test. Pilot test results showed no significant difference in comprehension between the traditional visuals and visual metaphor versions of the program, but the number of subjects was too small to detect any but extremely strong effects (Cohen, 1969). A full-scale version of this study has been conducted and the data are now being analyzed.

Viewers, at least those of college age, appear to accept the visual metaphor as no different from other television production techniques. It has no detrimental effects on attitude, and preliminary results indicate it has none on comprehension either. Therefore, the visual metaphor could take its place in the television production technique repertoire as one more way of visualizing information. Whether the additional creative challenge of creating a visual metaphor will be repaid with an increase in viewer understanding has yet to be determined.

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Visualizing Technology: An Analysis of Preservice Teacher's Classroom Maps

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Observing the arrangement of a teacher's classroom can suggest much about the educational perspectives and values of that professional. Kohl suggests that "the placement of objects in space is not arbitrary and rooms represent in physical form the spirit and soul of places and institutions. A teacher's room tells us something about who he [sic] is and what he [sic] is doing" (1969, p. 35). As Kohl points out, a classroom reflects a teacher's personal as well as professional philosophies and interests. A classroom also reflects, on direct and symbolic levels, a teacher's views of teaching and learning (Cohn, Kottkamp & Provenzo, 1987; Provenzo & Wolfe, 1974). Traditionally, the teacher has been seen as a dispenser of knowledge and the students as ready vessels to be filled. On a direct level, this perspective may be reflected by a teacher arranging the classroom with straight rows of desks facing toward the preeminent teacher's desk located at the front of the room. If this straight-row arrangement precludes students from seeing and conversing appropriately with each other, analysis of the classroom arrangement on the symbolic level would suggest that the teacher does not value class discussion or interaction.

Recently, the teacher's role has shifted to that of a supporter, facilitator, and coach as well as a creator and organizer of learning environments. If a teacher believes that learning involves the active engagement of students in constructing their own knowledge and understanding through interaction with and support from "the world of people and objects and through the use of technology of many kinds" (Sheingold, 1991, p.18), a teacher may be especially interested in arranging a physical learning environment conducive to these goals and in providing a variety of learning resources for students.

Technological innovations such as videotape, laser discs, and audio recordings provide teachers with electronic resources to develop classroom learning environments. In the context of this paper, the term *technology*, and its related derivatives, is used interchangeably with the term *electronic learning resources*. Both terms, narrowly defined herein, refer to equipment such as television sets, cassette tape players, and film projectors as well as the materials and programs presented using the equipment. The mere physical presence and the organization of these electronic resources in the classroom can provide insight into preservice teachers' thinking about technology and the role electronic resources play in the teaching and learning process.

Objectives of the Study

This study investigated a group of preservice teachers' thoughts regarding classroom technologies by asking them to *visualize* their ideal classrooms. The term *visualize* was first used to represent a request that the preservice teachers imagine, think about, and form mental images of what their ideal classroom would be like, based upon their personal philosophies of teaching and learning. Preservice teachers were then asked to *visualize*, or visually represent, their thinking on paper by completing a map of their ideal classroom.

The objectives of this study were to: 1) determine preservice teachers' perceptions of the electronic learning resources that they would include in their ideal classrooms, and 2) examine the distribution and placement of these electronic learning resources. In addition, the teachers' classroom maps themselves were examined to determine the general quality of the visual responses to the task and to look for patterns indicating potential uses of electronic learning resources and implications for classroom interaction.

Subjects

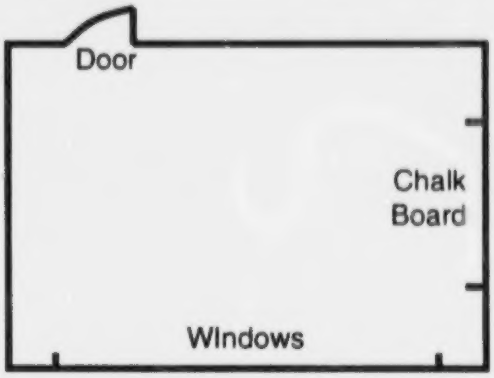
The participants in this study were education majors enrolled in undergraduate elementary education programs at two major state universities in the southeastern United States during the 1990-91 and 1991-92 academic years. A sample of 106 preservice teacher education majors, including 69 white females, 29 black females, 5 white males, and 3 black males participated in this study. Participants ranged from 19 to 25 years of age. These preservice teachers possessed a variety of knowledge and experience with the use of electronic learning resources.

Methods

The preservice teachers in this study were presented with a floor plan of a rectangular classroom showing only a door and a chalkboard appearing on the outline (see Figure 1). Participants were asked to think about and then to draw or visually represent a floorplan of their ideal classroom. Participants were instructed to include as much or as little detail as they felt necessary. There was no prompting by the instructor or discussion of ideas during this data collection period.

The ensuing classroom maps were analyzed to determine the presence and types of visual representations depicting electronic learning resources in the ideal classrooms. Data were triangulated and

Figure 1: Classroom map.



coded by category of the technology represented. This coding process included frequency counts for the learning resources represented in the classroom maps. No attempt was made to count individual units or numbers of the specific learning resource represented. For example, if six computers were drawn on the map, one tally mark was recorded in the computer category, not the actual number of individual computers that appeared on the map.

The analysis included an examination of the types of electronic learning resources represented, as well as identification of the location of the majority of the learning resources within the classroom. Since preservice teachers may have cited multiple learning resources on their classroom maps, percentages cited in this study total more than 100%. Non-electronic learning resources were excluded from this study.

Results

Of the 106 preservice teachers in this study, 75.5% (n=80) included electronic learning resources in their ideal classroom maps. Twenty six (24.5%) of the participants included no electronic learning resources of any kind (see Figure 2).

The most often cited electronic learning resource was the computer (see Figures 3 and 4). Seventy seven (72.6%) of the all participants (n=106) included the computer as an electronic learning resource; this number represents 96.2% of only those participants (n=80) who included electronic learning resources of some type. Participants' responses in this category included personal classroom computers, printers, computers designated for teacher's use, and computer supplies.

The second most often cited electronic learning resource in the classroom was video technology. Twenty five (23.6%) of the all preservice teachers (n=106) included video equipment in their classroom maps; this number represents 31.2% of only those participants (n=80) who included electronic learning resources of some type. The video category included responses that represented video images, either live or taped, and monitors to display video signals.

Figure 2: Preservice teachers' inclusion of electronic resources (N = 106).

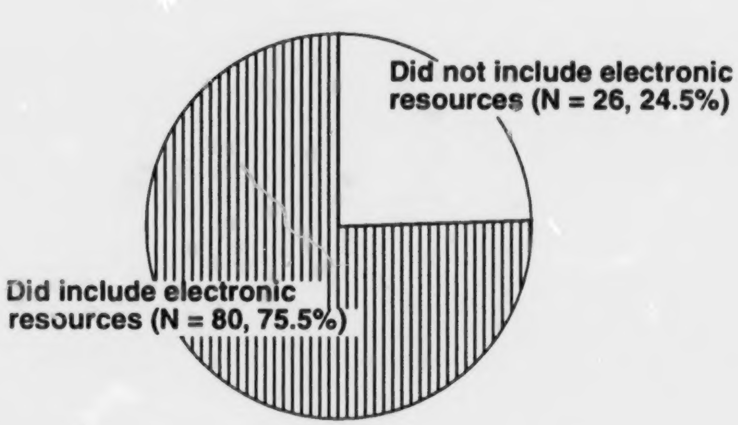


Figure 3: Type and frequency of electronic resources identified by preservice teachers (N = 106).

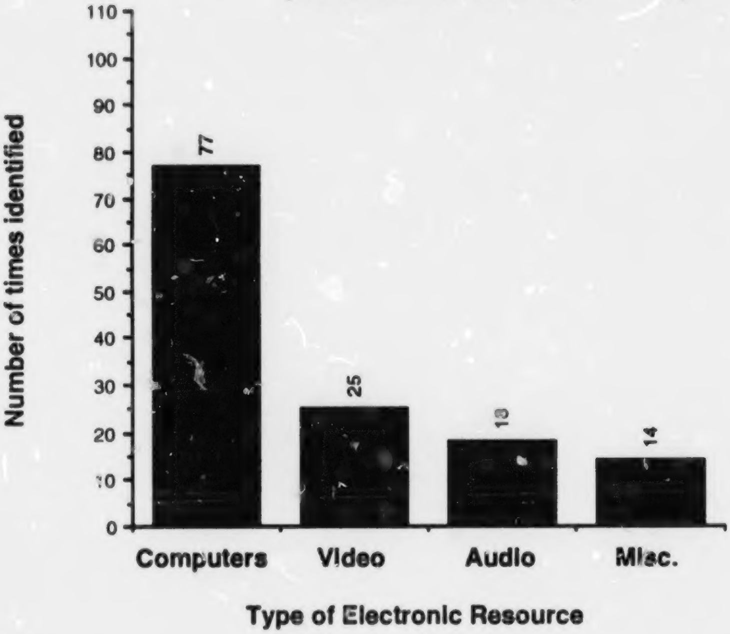
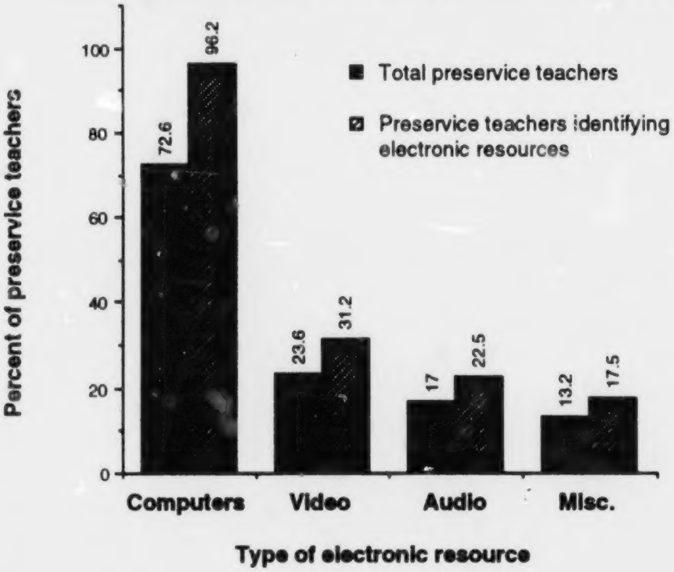


Figure 4: Type and percent of electronic resources identified by total preservice teachers (N = 106) and by only those preservice teachers who identified any electronic resources (N = 80).



This category also included references to broadcast, cable, or closed-circuit television and also videotape technology.

The third most frequently cited type of electronic learning resource was audio media. Eighteen (17.0%) of all the preservice teachers (n=106) included some type of audio equipment; this number represents 22.5% of only those participants (n=80) who included electronic learning resources of some type. Types of audio media included tape recorders and audio tapes, record players and records, and headsets. This category included only audio resources described as hardware or software and excluded areas generically termed "listening centers" in which the preservice teacher did not specify the presence of specific technology. The rationale behind this decision was that "listening center" is a general term which can refer to areas for conversation or dialogue as well as areas in which electronic equipment is available. Therefore, preservice teacher responses were noted in this category only when a particular type of equipment to be used in these centers was specified.

In addition to these three primary technologies cited by the preservice teachers, various other electronic learning resources were mentioned as well. Fourteen (13.2%) of all the preservice teachers (n=106) identified miscellaneous electronic learning resources; this number represents 17.5% of only those participants (n=80) who included electronic learning resources of some type. Responses tabulated in the miscellaneous category included projection screens, overhead projectors, and a diverse array of other technologies such as telephones, film, "multimedia," and interactive video. This category also included those technologies which researchers were not able to categorize by the description given; for example, "tapes" could be considered either audio or video tapes and were therefore counted in the miscellaneous category.

Distribution Of Learning Resources

As mentioned above, 75.5% (n=80) of the 106 preservice teachers responding to this study included electronic learning resources in their classroom maps. Only 24.5% (n=26) of those responding included no learning resources of any kind. Of the 80 preservice teachers who included electronic learning resources, 69.8% (n=56) indicated that those resources would be positioned around the perimeter of the classroom. Twenty four (30.2%) of the 80 respondents indicated that the learning resources would be distributed throughout the classroom. None of the respondents indicated that learning resources would be distributed in the interior of the classroom only (see Figures 5 and 6).

Discussion And Suggestions For Further Research

If as Kohl (1969) stated, the physical organization of a teacher's room tells us something about what the teacher is thinking and doing regarding classroom instruction and learning, then the classroom maps produced by these preservice teachers do indeed provide us with a glimpse into their thinking about electronic learning resources and their role in the classroom. Three-quarters of all preservice teachers (n=106) participating in this study included electronic learning resources in their classroom maps. These resources consisted primarily of computers, video, and audio media and which would be located

Figure 5: Preservice teachers' distribution of electronic resources (N = 106).

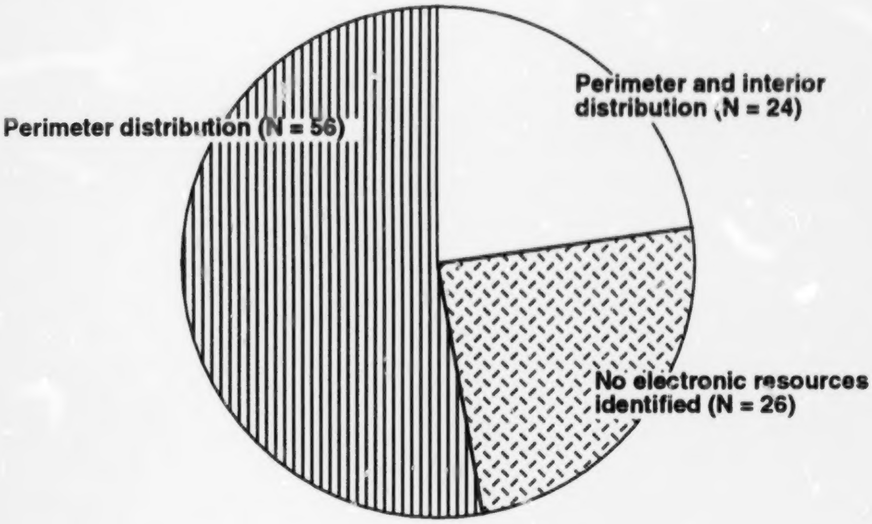
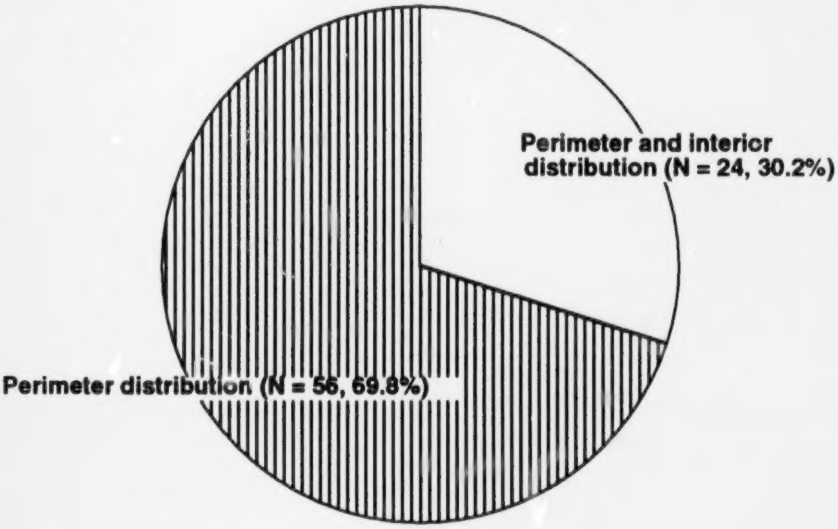


Figure 6: Distribution of electronic resources by preservice teachers who identified any type of electronic resource (N = 80).



primarily around the perimeter of the classroom.

At first glance, the data are encouraging and appear to indicate an awareness on the part of preservice teachers that computers, video, and audio media are important aspects of what "happens" during some teaching and learning processes and that these technologies are desirable elements in the classroom. The computer was the most frequently cited electronic learning resource, identified by almost 73% of all participants and over 96% of only those participants who cited some for of electronic learning resource. Although it may be tempting to be pleased with data which suggest that computers are apparently a highly recognized form of classroom technology, these figures must be balanced with the knowledge that nearly one-quarter of the preservice teachers included no electronic resources whosoever on their classroom maps. Similar caveats hold for the other types of classroom technologies identified in the study.

In addition, results of the study in no way can be taken to indicate that the same number of preservice teachers who *identify* classroom technologies on their maps would actually *use* these electronic resources during instruction. Nor can it be assumed that their students necessarily would do so. Tremendous gaps may exist between awareness of the availability of electronic resources and thier actual integration into classroom use.

Another disconcerting fact arising from the study is that the richness of electronic resources varied greatly. The classroom maps themselves indicate a great disparity among those preservice teachers who indicated any type of electronic learning resource, and responses of the 80 students who included electronic learning resources varied greatly in terms of the numbers and types of technologies identified. Researchers noted a trend that appeared to indicate that students who had been exposed to classroom uses of technologies in their coursework visualized numerically more as well as more varied types of electronic learning resources than students who did not receive this exposure. However, lack of control over prior experience of the participants prevent this finding from being offered as more than an observation. Further study of participants' visual representations of electronic resources in their ideal classrooms would be valuable if the influence of participants' prior knowledge of and experience with electronic learning resources could be included as a factor. It would also be interesting to ascertain if the type of electronic resource identified, for example, computers of video media, was related to prior knowledge of and experience with that particular technology as well. Preservice teachers may have a proclivity to identify electronic resources with which they feel most comfortable or knowledgeable, or they may merely be including the technologies which they have heard about and feel somehow obligated to identify. This is an area for further study.

The finding that the majority of preservice teachers who identified electronic learning resources placed them around the perimeter of the classroom is hardly surprising knowing that typical classrooms have power sources around the classroom walls and only in rare cases in the interior of the room. It is interesting to muse that traditional architectural constraints rather than educational philosophy may influence how preservice teachers organize and arrange electronic resources. This architectural obstacle may add a new dimension to Kohl's (1969) contention that classrooms operate on direct and symbolic levels. If teachers do value electronic resources and wish to make them an integral part of the teaching and learning environment by arranging them in the "center of the action in the center of the room," they may be confronted with physical barriers to the actualization of their educational philosophy. This speculation goes beyond the data collected, but the preservice teachers' classroom maps may reflect a predisposition to arrange technology according to their awareness of existing physical limitations rather than in accordance with their instructional aspirations.

Although the data do no more than support an observational comment, a great disparity in the quality of the visual representations also was noted. Some preservice teachers' visual representations were rich, colorful, and carefully detailed. Other classroom maps were impoverished, both in terms of content and creativity. Faculty working with the preservice teachers noted that students whose other work in class indicated that they would design rich, interactive learning environments produced thoughtful, creative, detailed visual representations that indeed would support a facilitative, interactive learning environment replete with electronic learning resources. Students who performed less well in other class assignments tended to submit less thoughtful, less detailed classroom maps and included fewer types of technology. Additional research could be conducted to support these observations.

Finally, assigning the production of a visual representation of an ideal classroom was in itself a successful aspect of the class in which the activity was included. Students found that visualizing their thoughts and philosophies by reflecting them in a classroom map was a valuable exercise. One preservice teacher who had been required to draw a classroom map at the beginning of her program also voluntarily completed a map at the end of her two-year program of study. The first map depicted straight rows of chairs facing toward the teacher's desk; the second map showed student desks grouped together and the teacher's desk in the corner. During conversations, the preservice teacher emphasized how her educational philosophy had changed over the terms and that the most current classroom map demonstrated her interest in cooperative learning groups and the role of teacher as facilitator and mentor. The student chose to include these two classroom maps in her professional portfolio to show her growth and development as a teacher. Additional research and student interviews should be conducted to investigate whether visual representations indeed depict preservice teachers' verbalized educational philosophies and also their priorities related to electronic learning resources.

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Women and the Discourses of the Visual: Where are Women in this Picture?

Linda Condron
Patricia O'Riley
Suzanne Damarin

Visual metaphors have been used to represent knowledge and understanding, at least since the time of Plato. In contemporary times, the visual display of information is pervasive. An increasing emphasis on the visual over other sensory domains is evident as both cause and effect of the growth of electronic media and technologies: video games, microcomputers television, multimedia, and so on. Those who create these technologies, or who use them most frequently or effectively, are increasingly advantaged within society. This advantage accrues in several ways. With the exponential growth of information, the acceptance of information as capital, and the increasing utilization of visual and spatial models and modes for the representation and control of information, "mastery" of the visual becomes key to success in traditional capitalistic terms. Secondly, insofar as the visual replaces the verbal as a dominant mode in which ideas are communicated and explored, and realities are constructed and investigated, visual literacy displaces the literacy of words and symbols. Thirdly, insofar as social relations among individuals and groups of persons are affected and even determined by the representations of some persons or groups to others, the creation by one person of the visual-spatial images or realities of others becomes an increasingly powerful activity.

Thus, as we consider the growth in importance of visual and spatial representations and "realities," we are dealing with power. As feminists, we are concerned with the effects of this power on those who have been disempowered in previous regimes of knowledge and "truth". As educators, we are particularly concerned with these effects within schools and other institutions of learning. In this paper, and in the larger project of which it is a part, we focus primarily on women and interrogate the place of women in the existing and emergent discourses of the visual and spatial.

The discourses of the visual-spatial can be seen as challenging the scientific as the dominant mode of knowing and understanding. As we move toward the information society and what Donna Haraway calls the "informatics of domination," epistemological underpinnings shift from those of an "organic industrial society to a polymorphous information system." Haraway delineates specifics of this transition by listing pairs of concepts, contrasting the old and organic with the new and informational (Haraway, 1991, pp. 161-162, 209-210). Generally, these pairs indicate movement away from assumptions of a pre-existing "reality" which we seek to understand via science to construction of "realities" which we must navigate. Some of her pairs clearly implicate or suggest a transition to visual-spatial ways of knowing; depth and integrity, for example, yield to surface and boundary. Haraway's work reveals the general ways in which gender is implicated in the informatics of domination. In our work we seek to identify specific gendered aspects of the visual-spatial within these informatics.

The feminist study of science interrogates not only the findings of science *per se,* but also multiple discourses which intersect the scientific (e.g., history and sociology of science, science museums, science education, among others). Analogously, we interrogate various discourses which intersect the visual-spatial. Where gender and the visual-spatial emerge together we find that the visual and spatial are almost always associated with the masculine perspective; our purpose here is to begin an examination of those associations.

A partial catalog of associations. The social construction of woman is tied to visual-spatial requirements or representations in diverse domains of social, professional, and academic discourse. Among the fields in which feminist analysis has revealed visual-spatial rationales for negative treatment of women are medicine, the weight loss industry, advertising, entertainment, pornography, the built environment, work environments, and virtually all fields of academic study. The representation of women in scholarly discourse by visual forms, by verbal descriptions of visible female presences, and by clinical descriptions of visible attributes and problematic vision and visual ability among women have all been subject to feminist critique. Within the discourses and analyses of education, there are several important associations between gender and the visual-spatial. The attribution of low spatial ability to females, the panoptican organization of classrooms, the portrayal of girls and women in educational materials, and the influence of engineering on these materials all mitigate against women. Moreover, Mary Belenkey and her colleagues (1986) argue that vision, a frequent metaphor for knowledge and understanding, is not an apt description for women's ways of knowing.

As we consider this partial listing of areas in which gender and the visual-spatial come together to affect women's lives, three categories of concern emerge: (1) visual representation of women, (2) visual-spatial abilities of women, and (3) rights of women to use space. In the remainder of this paper, we turn to brief discussion of issues, one selected from each of these categories.

Visual representation of women in educational materials. Feminist critique of the visual arts and of visions within the literary arts is extensive. A sampling of feminist writings on topics ranging from art history to pornography, from silent films to cyberspace, and from classical theatre to post-modern performance art reveals that visual representations are often problematic from a feminist perspective. Like literature, visual representations conform to patriarchal conventions which evolved from male projects created to be shown to other men. Various scholars have argued that women are often alienated from/by these conventions, that the adoption and adaption of conventions developed in fields of entertainment and the arts to school uses often carry bias into the classroom, and that for women (more than for men), learning to interpret visual information as intended by the materials designer can be problematic.

Discussions of this gender difference are complex. Michelle Barrett (1987) has identified three distinct locations or kinds of difference. *Experiential difference* between the sexes assumes that men and women are so situated within society that they have different expectations of the world and different experiences of it. *Positional difference* between the sexes assumes that gender is a semiotic category; that is, women and men have different locations within a discourse, and the presence of one and/or the other sex in a conversation, discourse, painting, or drama carries different meanings. *Psychoanalytic difference* is the difference (presumed) in the unconscious of persons of different genders.

Recognizing that works of art are both constructed and viewed or experienced within the larger domain of gender difference, feminist art historians such as Griselda Pollock (1992) concern themselves with these differences. Pollock and others reject the notion that a work of art is a "window on the world" with the artist "an inspired seer, a visionary, an eye." Instead, these critics adopt a semiotic view that "often involves a rejection of the prevailing ideologies of art as purely visual experience unmediated by language and social relations (p. iv)." Thus, for Pollock and for other feminist art historians, the visual arts are not "purely visual;" experiential, positional, and psychoanalytic differences between and among viewers entail differences in the visual experience of the art.

Visual representations of women and men reflect the sex/gender of the artist in that they are constructed from her/his locations on Barrett's three dimensions of difference; the experiences, position, and psyche of the graphic artist influence decisions as to what is appropriate, typical, and meaningful. Once rendered, the visual representation is "read" by various persons in ways that also vary with their locations on Barrett's three dimensions of difference. In this context, the major concern of the authors is not with the multiplicity of representations and interpretations. Rather, our concern is that, despite this multiplicity and potential for variety in the representation of women, the same stereotypical types of images emerges so frequently. The types which seem to emerge repeatedly originated in pornography where their purpose was to objectify women.

Among the visual art forms which influence the visual mediation of instruction, pornography cannot be ignored; Ann Devaney (1990) points out that pornographic codes have been adapted from hard core porn to MTV, film, and related entertainment, and from these contexts to instructional television. Multiply marked by sexual difference, these images become, not discussable forms, but "visual information." Within the school context, they are not open to the same kind of textual criticism that feminist art historians find essential for several reasons. First, they provide "the form" and not "the content" which is the subject of instruction and thus the discussable material. Secondly, the gendered differences in the viewing experience is problematic; experiential, positional, and psychoanalytic differences among students contribute to differential readings of the visual material.

That these codes have been imported into educational TV programming on mathematics (Devaney, 1990) poses a potential barrier to girls' and women's math learning. We turn now to other visual-spatial factors which have been studied in relation to mathematics ability and achievement.

Mathematics, Visual-spatial Ability, and Women. Our quest for and expression of knowledge about the world we experience is conducted by means of a great deal of abstraction, supported by a system of formal education in the ways of abstract thinking and reasoning. The history of modern education can be read as a story of the exclusion of women from formal education, and the assignment of women to tasks educated men haven't wanted for themselves. Thus have women been relegated to the "private" sphere, or at least an invisible status, as keepers of the hearth, care givers, or clerical staff in the corporate world. This education/ exclusion process has involved the labeling of women as illogical, non-mathematical, and disinclined toward the scientific. Yet there have always been women actively involved in mathematics and the sciences.

In an effort to explain these phenomena scientifically, sex differences were studied extensively through the 1970s and early 1980s. Characteristics and abilities of all sorts were examined in attempts to draw generalizations about women and men and their differences (Maccoby & Jacklin, 1974). Research into sex-related differences in mathematics achievement explored and attempted to interpret the influence of several categories of variables including cognitive, affective , educational, biological, and socio-cultural factors. Among the cognitive variables, visual-spatial ability has been the topic of a great deal of speculation and investigation, particularly by Elizabeth Fennema and her colleagues.

Lindsay Tartre (1990) gives an impressive treatment of the topic in her 1990 contribution to Fennema & Leder's *Mathematics and Gender.* She begins with a discussion of the various "spatial skills" that have been enumerated, described, operationally defined, and even "measured". She names the people involved in the early development of instruments to test for each of these skills, shows specific examples of items used in assessing them, and briefly presents the results of early tests. She organizes all of this into a taxonomy of spatial skills, the two primary divisions of which are "spatial visualization" and "spatial orientation". Spatial visualization is the set of spatial skills most familiar to us from casual references, and it is more commonly addressed in the literature on spatial skills than is spatial orientation. Spatial visualization involves the ability to mentally manipulate objects through rotations, reflections, and translations; and to mentally transform a 2- or 3-dimensional figure into other renditions of the figure. Spatial orientation involves mentally imagining oneself in a different perspective with respect to an object under consideration. The most familiar sort of task for assessing a spatial orientation skill is the "Hidden Figures Test", which is not unlike the "Where's Waldo?" activities on the Sunday comics pages. Success with this activity has been considered to be associated with an "analytic" cognitive style, or "field independence" .

In separate studies of each of these variables, Tartre used four groups of subjects: girls with high spatial skills, girls with low spatial skills, boys with high spatial skills, and boys with low spatial skills. In the spatial visualization study, she found no overall difference between the two spatial skill level groups for the number of problems solved correctly, but detected some differences in patterns of behavior. In the spatial orientation study, no overall gender difference was found in the number of correct answers but two significant differences were found in how females and males solved the problems. Tartre goes on to observe that in general, spatial skill "does seem to be more related to mathematics performance for females than for males. In both of these studies, females who scored high on a test of spatial skill achieved as well as, and in some cases much better than, the male groups on mathematics achievement and measures of many other strategic variables. However, females who scored low on a test of spatial skill experienced difficulty in accomplishing many tasks involved in solving mathematics problems" (p. 57). Tartre concludes that these studies do not support the conjecture that males' greater mathematics achievement is due to possession of higher levels of skill in spatial visualization or spatial orientation; rather, these studies suggest a need for a reassessment of the the inter-relationships among sex, spatial skills, and mathematics achievement.

Other studies, as well, have failed to establish strong correlations among the variables of sex, spatial ability, and mathematics achievement. Ann Schonberger (1990), for example, has investigated the possibility that academic areas such as physics--along with its "mechanical skills"-- may serve to filter girls from advanced study. Like Tartre, she found that existing sex differences in skills are not correlated with persistence in technical subjects; she suggests that sociocultural factors play the most important role in women's success in technical studies.

These findings do not reflect new developments, but continue a long history. Patricia Cline Cohen (1982), in her history of numeracy in the United States, points out that the abilities associated with mathematical skill have varied over time. Although today, weak performance in geometry is often thought to be associated with weak spatial abilities, she argues that "those nineteenth-century educators who claimed that geometry was impossible for women to understand would never have assumed females to be deficient in spatial relations, for that would have been inconsistent with women's demonstrated talents in constructing garments out of flat goods without benefit of patterns" (p. 8). Today, the "rote memory work" that was crucial in the eighteenth-century conception of arithmetic might be thought of as central to the "computational superiority" girls are often said to have over boys. Computational excellence, however, is today thought unimpressive by comparison with the "analytic superiority" boys are said to have over girls.

The study of arithmetic was once seen to serve the double function of commercial skill development and exercise in logical reasoning. In our own time we are experiencing a transition in which the study of mathematics serves the double function of exercise in logical reasoning, and support for scientific and technological endeavor; hence, the ability to study mathematics successfully is conceptually linked to reasoning and visual-spatial ability. Our challenge is to define visual spatial abilities and the technical endeavor with which they are associated in ways that include women and that accept women's involvement in and contributions to visual literacy and the technologies that define and utilize it. Only then will education support the full participation of women in society, a participation made problematic by cultural conceptions of women and space.

Re/mapping Women and Space in the "Information" Age. Throughout history and around the world, visual metaphors have not only facilitated the ideological distancing of the mind from the body, but they have also facilitated the distancing of East from West, nature from culture, private from public, and female from male in our lived spatial arrangements. "The logic of the visual is a male logic," that considers "vision as a 'higher' and touch as a 'lower' sense" (Keller & Grontkowski, 1983). The spatial character of visual metaphors is embedded in much of our everyday language. For instance, we use terms such as "private and public spheres", "political circles," "low life," "high society," "close-minded," and "far-reaching." Such language characterizes the common notion that we communicate principally with our minds; however, Shirley Ardener (1981) contends that spatial positioning is another form of communicating that imposes restraints on mobility, thus shaping our perceptions of space. She refers to this as "social mapping"-- placing people in space using culturally determined rules for defining boundaries. She further contends that such mappings "exert real influence on use of space and on mental maps of women and men" (p. 28).

How we take up our worlds depends on our notions of space in the physical world and in our social reality within that world. Examining the spatial contours and borders of women's lives, and asking questions about women's access to resources and about the spaces in which women work, expose "the very clear differences between men and women, and among women" (Seager, 1992, p. 217). These queries tell us clearly that space is gendered. According to Daphne Spain (1992), the gendering of spaces also serves to "separate women from knowledge used by men to produce and reproduce power and privilege" (p. 3). This is particularly relevant for women during the current bent for mass accumulation of information; once collected, information is organized using spatial metaphors and representations. Considering women's historical spatial positioning in relation to production and reproduction of knowledge, how can women challenge, resist, and/or shape the borders of this newest form of space?

Griselda Pollack (1988) argues that with modernity there was transformation of the public world and its associated consciousness. Visible activities were relocated to invisible spaces through social stratification and urban planning. The division of the public and private spheres not only constructed a specifically bourgeois way of life, but also a structural metaphorical map of femininity and masculinity--domestic and reproductive spaces for women, city and productive spaces for men. Pollack refers to men's position within this bourgeois space as "the flâneur," a spectator of his world, who gave an illusion of objectification and disengagement from other senses. There was no female equivalent of the flâneur; feminine, bourgeois women did go out in public space, "to promenade, go shopping, or visiting or simply to be on display" (p. 68). However, women of low socio-economic status who entered the public space to work "ceased to be women" (p. 68), and single women who ventured out alone at night were considered whores.

Now, as then, for women to enter the public space they need to "reclassify themselves as men" (Ardener, 1981), or become "one of the boys" (Wajcman, 1991). Entering male space on male terms "contributes to the devaluation of women and the concomitant reduction of their symbolic space....They must learn to manipulate male symbols....and as exceptional women... to excel at this manipulation inside the male domain" (Ardener, 1981, p. 65). Uma Narayan (1989) writes that because women exist in two spheres, they need to have "double vision," and they must not only understand the knowledge of the dominant group, but they must also understand the knowledge of their own lived experience. This multiple situatedness of women's lives becomes even more complex when intersected with class, race/culture, and sexuality. Forcing women to adapt to a world envisioned and shaped by powerful men, a group disadvantaged by needing only the knowledge of a single vision, positions women in contradiction and tension with their own lived realities.

Concluding remarks. Schools are gendered spaces. They play a significant role in producing and reproducing gendered ideological and social mappings through their production and reproduction of gendered knowledge. The underlying values, assumptions, and beliefs of the knowledge offered in schools, bear the imprint of western, white, middle-class, heterosexual, male perspectives. As discussed above, this imprint is also encoded in the spatial organization of schools, in the assumptions about the ability of women to engage in spatial thinking, and in the materials of instruction. In this age of "information," equitable production and distribution of knowledge within the gendered spaces of school is particularly problematic.

If we are to have equitable schooling, it becomes essential that the implementation of visual literacy curricula reflect the ways in which visual-spatial discourses and norms operate in the lives of all students. Designers of visual literacy curricula have long been leaders in exposing to students the ways in which television and other visual media shape understandings of the events and individuals portrayed. The introduction and proliferation of new, more interactive visual media and technologies, as well as the increasing use and importance of these in contexts of decision making and in all fields of knowledge construction, pose new challenges for visual literacy designers and educators. An important source of challenges is the gender non-neutrality of visual-spatial domains and discourses as they have been constructed to date, and as they contribute to the construction of the social environment.

Recognizing the pervasiveness and interrelatedness of gendered discourses of the visual and spatial is a first step toward meeting the challenge. The three discourses discussed above were chosen to represent very different aspects of the gendering of the visual-spatial. Yet, our brief examination uncovers their interlocking features. Each of Wallace's dimensions of sex/gender difference involved in the "reading and writing" of visual materials mirrors ways in which the spatial arrangements of society encode and create gender difference. One of the means of maintaining these arrangements over the years has been differential access to mathematics. This "critical filter" separating women from higher education, and thus from power in the public sphere, has been rationalized in terms of mythical differences in visual-spatial ability. A continuing separation of women from mathematics is supported by the use of gendered images in instructional materials. At least some of these images borrow from pornography and encode the view of the flaneur. Thus, these three examples form an interlocking network of discourses of the visual.

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An Eclectic Approach to the Interpretation of Visual Statements

Deborah Curtiss

How to interpret visual expressions, whether created as media communications or art, is often a perplexing task. This topic is vast in both scope and possibilities, and has challenged both great thinkers and common citizens probably as long as images have been created. In recent years art historians have engaged in a heated and sometimes polemical and divisive argument on the proper approach to the interpretation of content in art. On one side are those who interpret work based upon a pre-modern, connoisseurial tradition, on another are those who adopt the modern, largely structuralist approach, and finally, those who assert that a work must be interpreted according to its social context and social communication, a post-modern or post-structuralist approach.

During this time I have propounded interpreting visual statements from the holistic perspective of **visual literacy**, which encompasses a variety of approaches. In my opinion, a visually literate individual's lexicon for interpreting visual statements, irrespective of medium, would include an eclectic array of possibilities. Yet few of us identify what these various ways might include. In talks that I have given previously, I have provided a list identifying the iconographic, connoisseurial, structuralist, social, semiotic, and deconstructionist approaches. There are others, some yet to be catalogued .

As a writer and thinker about issues in visual literacy, I have done little thus far to define concepts of interpretation, demonstrate how they are used, or to provide effective examples of a visually literate interpretation process. In this paper I intend to provide some definitions and demonstrations, not a definitive study., and hope it will bring the topic to the attention of others for thought and development. Feedback and leads would be especially appreciated, as this effort is the beginning of what I expect to be ongoing research for the next few years. I hope that this work will result in a persuasive argument for art history scholars to adopt a broader, more inclusive approach and, secondly, information that will be relevant to interpreting all visual communications, not only works of art.

Pre-Modern

The pre-modern or **connoisseurial** approach, steeped deeply in the cultural traditions of Western art and civilization, carries considerable baggage, baggage that for centuries was considered to be evidence of its accomplishment: wealth, unquestioned excellence and superiority. It espoused elitist approaches to judging the fineness, the "fine artness," of paintings, sculpture, drawings and prints—those arts commonly held to be the fine arts.

Assessment of quality is central to the connoisseurial approach: quality of the technical ability of the artist, quality of the materials used, quality of the artist's understanding of compositional principles, quality of poetic content, and quality of esthetic merit. All of these assessments and judgments, either implicitly or explicitly, were predicated upon a deep conviction of a hierarchical esthetic. From the essential ideal—toward which all aspire but never quite achieve—of Plato, to the finely honed critical judgment of Kant, a highest order of excellence served as both the basis and the pinnacle of achievement in visual expression. For centuries, few questioned the value of these aspirations as they, in turn, served to inspire generations of artists, clerics, scholars and plain folk alike.

The connoisseurial approach encompasses the study of iconography, symbolism and, to an extent, underlying structure. A few definitions may be in order. A **symbol** is an image or object, that stands for, is a metaphor for, something else, and may or may not be known or understood by others. An **icon** can be thought of as a symbol with animate characteristics. A symbol or icon becomes a **sign**, when it becomes a metonym, a representation of something that has more or less entered common or shared parlance and understanding; i.e., when both signifier and signified are known and understood. In computer-speak, I suspect the term *icon*, actually a sign, was chosen to differentiate it from many ways the word, sign, is used in our language.

From early Christian art we were introduced to icons and symbols as a form of shorthand to express, in a simple or single image, a depth of meaning and significance. All indoctrinated with the religion would understand these symbols, from which they would draw moral and religious messages, content, and inspiration.[1] For example, in The Annunciation by Jan van Eyck (1385-1441),[2] one discovers a number of symbols that were in conventional use in the first half of the 15th century, as were architectural analogies that the artist used to communicate specific content. The Romanesque clerestory in which this scene is placed represents the Old Testament and Judaism as indicated by the single high window which depicts the Lord of Hosts of the Israelites. It is flanked by mural paintings of the finding of Moses and the giving of the Ten Commandments. These events were thought, by early Christians, to respectively presage the acceptance of Christ by the faithful, and the giving of the New Covenant.

The shift from the Romanesque on high to more gothic elements lower in the painting symbolizes the shift to Christianity and the New Testament. The three windows at the rear represent the Trinity. The holy spirit, in the form of a dove descends toward the Virgin, symbolizing immaculate conception; the lilies represent her purity. Subjects in the floor panels support, in more ways than one, this pivotal moment in the history of religion. They depict the death of Samson, prefiguring the Crucifixion, and David slaying Goliath, prefiguring the triumph of Christ over Satan. Signs of the zodiac, seen in the corners of the floor panels were, at the time, a common device for proclaiming God's dominion over both the physical and spiritual universe. The footstool may illustrate, together with the high single window, a passage from Isaiah (66:1): "The heaven is my throne, and the earth is my footstool."

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[1] Unable to include all the images shown when this paper was delivered, the following locations and descriptions are offered for those who wish to look them up.

[2] National Gallery of Art, Washington, DC. Analysis acknowledgment to Ralph Mayer, *A Dictionary of Art Terms & Techniques*, N.Y., Thomas C. Crowell, 1975.

By using an example from the early 15th century, I run the risk of leaving iconographic and symbolic analysis lost in the past. So let us look at a painting by Jean-Michel Basquiat called World Crown,[3] painted in the 1980s. Let's make a similar analysi—based upon symbols, icons and analogies—of this work by someone of Haitian and Puerto Rican descent, who catapulted to early fame as a New York City "writer," a euphemism for graffiti artist, shortly before this work was created.

The architectural environment appears to be that of the boxing club, not an arena, perhaps symbolizing a private rather than public encounter. The two crowns, one appearing to be a representation painted on a paper tacked to the wall, the other an object floating over the head of one of the combatants, together with the sign stating "ACRLA World + Crown," require us to draw upon our knowledge of boxing (acronym unknown). A champion fight is being waged here. The figure on the left appears to be mortal, but could be what in Haiti is called the *bon ange*. The figure on the right, black with a skull-like head is a common icon of death, and was featured in several of Basquiat's works as a self-portrait. That he died a few years later at the age of 28 of a drug overdose, suggests that this painting depicts a moment no less pivotal in his life and times than that of the Virgin and the history of religion in van Eyck's Annunciation. Even though we have taken an approach, steeped in Western esthetic tradition, and applied it to a decidedly post-modern work, we are unavoidably enmeshed in the social: social content, social comment, social context, political meaning, and so forth.

A strictly **social** interpretation tends to look outside of, as well as at the work being studied. Who is the artist? How was he or she placed in society? What are the cultural forces in the society in which the artist was raised and/or is working? What is the message of the visual statement in terms of political and social import? How can this message be evaluated using the prevailing values of the culture of the artist rather than the viewer?

This approach has no less validity with respect to Renaissance art than contemporary visual expression. In Botticelli's (1445-1510) Annunciation,[4] painted a generation after the van Eyck, the distinguishing aspects have to do with place and culture. Notice the open door, the warmth of the Umbrian landscape in the background. Both Virgins are wearing garments common to the times, yet the sensuality of the figures and the garments swirling around them, suggest a passion in the Italian Botticelli that is quite absent in the more staid and static Netherlander, van Eyck.

Similarly, George Bellows (1882-1925), American realist of the early 20th century, depicts boxers quite differently from Basquiat of Haitian background, although both works were created in New York during the 20th century. Entitled, Both Members of this Club,[5] and painted in 1909, the social intent appears clear. A white and black fighter locked in combat as equals in the boxing ring presaged the triumph of Joe Louis by 28 years; the boxing ring a metaphor for our boxed-in society. Looking at visual statements within a social context for their meaning in sociopolitical terms can be both illuminating and deeply rewarding.

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[3] Location unknown, published in *Artforum*, December, 1981.

[4] Uffizi Gallery, Florence, Italy.

[5] National Gallery of Art, Washington, DC.

Modern

To continue our lexicon, a modernist or **structural** analysis entails looking beyond the subject matter to the underlying structure of a visual statement in which energies and suggestive powers such as hierarchies, may be embedded. I have frequently shown these structural analyses of two paintings: one by Georgia O'Keeffe,[6] showing that it is gracefully poised and composed, the other by William Sidney Mount, which is helter-skelter.[7] Each underlying structure impacts the effectiveness of the content. Looking at the structure of the Mount painting, a late 19th century work entitled The Painter's Triumph, from a 20th century psychoanalytic perspective, we may interpret that Mount, like most viewers, was so taken with the message he was trying to convey that he was unaware of the undercurrents of chaos, of conflicting forces that detract from the success of the painting as a whole, and subsequently, Mount's reputation as a significant painter.

If we look at the structure of the paintings previously considered, we observe that the format of the Annunciation is lofty, aspiring; that of World Crown compressed. Both are slightly unbalanced, using similar bilateral or mirroring weightings of figures in space, the right side heavier in each. In one, space is deep, the other shallow. The van Eyck figures are in positions of reverence and awe, the Basquiat in striking agitation. These observations lead us to understand and appreciate the effect of the structure on the meaning of each painting. Each structure represents social meaning and social context, none more or less than the other. Structure was a favorite of modernist thinking. Modern art, as in this painting by Sonja Delaunay,[8] cele-brated structure and pure form as an end in itself.

Post-Modern

As with any movement that uses post as a prefix, post-modernist thought rejects structure especially, but also most of the foregoing approaches to interpreting visual statements. As an artist, I can create what I want, with no concern whatsoever for an audience. In fact, I feel, when thoughts of interpretation creep into my creative process, they contaminate it, both the process and the work. When this happens, I am no longer creating art, but a message to which the visual statement becomes a servant. In the realm of art, how others interpret my work is entirely up to them. In Dewey's terms,[9] my paintings are only half of the visual experience which must be completed by a viewer. While delighted with the variety of interpretations of my work, I must never let them affect or dictate what I create. That would be, in the struggles of an artist, corruption.

Yet today, in the age of infology and edutainment, the overwhelming production of visual images pervading every reach of contemporary life, most members of IVLA must be actively concerned with the *content* of the visual statements they make. What is it they *intend* to communicate? What media and techniques will *serve* that message most effectively, *enhance* it, *clarify* it, and *carry it forth* into the world? How can we assess the success of the communication?

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[6] Georgia O'Keeffe, Pelvis with Moon, 1943, Norton Gallery of Art, West Palm Beach, FL. Reproduced in Curtiss, D. *Introduction to Visual Literacy*, (Englewood Cliffs, NJ, Prentice-Hall, 1987) p. 56.

[7] William Sidney Mount, The Painter's Triumph (1838) The Pennsylvania Academy of Fine Arts, Philadelphia, PA. Reproduced in Curtiss, D. op.cit., p. 57.

[8] Sonja Delaunay, Rhyme Color Opus 1541, 1967, Gimpel Gallery, London, UK.

[9] Dewey, John, *Art as Experience*,

This process of intentional visual communication with specific message is, I posit, no less important than creating art. Today, pragmatically, visual/verbal communications may well be much more important—due to their widespread and far-reaching use—than the lofty ideals that have traditionally defined art. Most significantly, visual/verbal communications are essential to the quality of life in a post-modern world, a world defined by global intermedial and intercultural communications.

Enter semiotics, hermeneutics and deconstruction. Enter socio-political movements such as feminism, multiculturalism and pan-sexualism, all of which question the dominance of the Western, male, heterosexual perspective.

A **semiotic** approach goes beyond the image to meaning embedded in the pragmatic, semantic and/or syntactical purpose or intent of the creator. Developed largely within language with literary texts, semioticists and their compatriots, hermeneuticists concerned especially with meaning—both disciplines, by the way, dating to the first millennium—represent a natural response to the information explosion of the late 20th century. When they emerge from their self-referential, closed system, and relate to consensual reality, their relevance and importance lies in establishing the paradigms by which we may develop the ability to interpret visual statements *as they are being created.*

Thus we may look at a couple of images used in advertising—images that have the explicit purpose of conveying specific information to affect a specific audience to respond in a specific way.[10] Most are geared to the audience thought to be, and demographically demonstrated to be, most vulnerable to suggestion, most likely to take self image seriously, and therefore most responsive to the appeal to buy, buy, buy. This population, young adults, is also perceived to be at the height of their sexual powers, prowess and insecurity. The next older segment of society, the mid-life group, likes to believe they are still at the height of their sexual powers and prowess, but with security. Therefore, images of actual and implied sexuality abound in advertising today. It doesn't quite take a hermeneuticist to figure out what is being said, to whom, for what purpose, yet the focus upon hermeneutics in literature, its use in anthropology and history, impacts the way we understand interpretation of visual statements today. That understanding, in turn, influences those of us who make visual statements with the specific intent of communicating a message. The medium is *not* the message. We claim and use the medium as the vehicle of the message. The message is thoroughly worked out and reworked, on paper and on story boards, sometimes long before production of the visual statement even begins.

Enter **deconstruction.** Do deconstructionists have all the fun? Upon reading a text or looking at an image, the deconstructionist draws out conflicting logics of sense and implication with the intent of showing that the text or image never exactly means what it says, or says what it means. They have shown us that we have no visual experience—whether of a visual statement generally agreed upon to be a work of art, a visual statement such as an advertisement or instructional video with specific content to be communicated, or the visible world in which we live—that we have no visual experience that won't have been, to some extent, programmed by those ideas of form, content, meaning, value, etc., that are the legacy of a combination of our personal and collective history. For most of us that is a Western esthetic. Others who may have been born and raised in a non-western culture, may add to that. Women bring a perspective that some insist is radically different from that which our forefathers assumed. Gays and lesbians too look askance at the pervasive heterosexual sell in the images shown earlier. But all of us, being the sum total of our personal and acculturated experience, view and experience visual statements, in all media, through the lenses of our life-long program as it has evolved.

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[10] A Newport cigarette advertisement with a young man and woman looking at one another across a candy machine spewing forth candy balls; and an advertisement for Obsession perfume with a nude couple entwined in a complex, Pilobolus Dance Theater-like clutch. Also shown were works by Barbara Kruger, Buy Me, Annina Nosei Gallery; Robert Mapplethorpe photograph, Lisa Lyon, 1980; and Sue Coe, The Money Temple, 1986.

Thus, to a deconstructionist, there is no esthetic truth about visual statements, either inward or outward, that can validate one set of codes and conventions above another. There is no esthetic truth to serve as the ultimate reference point for a history of any genre conceived in terms of some grand outcome or teleology. All we have are various fictive devices to make sense of an otherwise unknowable reality.

If the reality of meaning in visual statements, as the deconstructionists purport, is essentially unknowable, why try to interpret them at all? Isn't it a waste of time?

Visual Literacy to the Rescue

Let us grant that our collective realities are singularly different. When we encounter a visual statement—whether a work of art that has just overwhelmed us with its power; an instructional video that in some way has left us with a vague, but as yet undiscerned sense of unease; or an advertisement that rankles with its ribald appeal—as visual literates we can look at it from a variety of perspectives. When we identify the symbols and understand their meaning and function, when we analyze the structure and understand its power, when we articulate the meaning as (and whatever) it communicates to us within our social context, and we appreciate that we won't arrive at a definitive interpretation, we know the visual statement much, much better. We have taken it more fully into our consciousness and thereby have made it a part of ourselves. The process and its product enrich us for deeper understanding and appreciation of a broader range of visual statements henceforth.

Of necessity, this paper is merely an introduction to the issues, and a brief rallying cry to address interpretation as an integral part of experiencing visual statements in all media. Several members of IVLA, with papers herein, are doing just that, offering varying perspectives. As we seek meaning in the visual statements we view and make, especially in this digital age, we add to, and find, meaning in our lives.

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Analog, Not Digital: Roots of Visual Literacy and Visual Intelligence

Paul Messaris

What is the cognitive basis of a viewer's ability to comprehend the meaning of a picture? Communication theorists often make a distinction between two different ways in which a sign or symbol can evoke meaning: on the one hand, digital representation, in which the symbol's domain of reference is conceptually "carved up" into discrete units which are represented by purely arbitrary symbols; and, on the other hand, analogical representation, in which the symbol retains a continuous correspondence with one or more dimensions of its referent. (A particularly lucid presentation of this distinction has been given by Bateson [1972], but variant formulations occur in a wide spectrum of theoretical writings, originating as far back as the work of Hume [1977] and Peirce [1991].)

Recent scholarship in visual communication has tended to emphasize the digital side of this distinction, focusing on technological developments in the coding of visual images for purposes of digital manipulation, storage, or transmission (e.g., see Bossen, 1985; Lasica, 1989; Mitchell, 1992; Reaves, 1989; Ritchin, 1990). This paper aims to draw attention back to certain aspects of visual communication in which analogical representation seems to play an important role. Specifically, the paper will argue that the mental process by which viewers derive meaning from pictures is often based on implicit analogical thinking.

Discussions of the analogical aspects of visual representation typically concentrate on the manifest content of images: the objects, events, or situations depicted in them. Although visual scholarship has done much to undermine the popular assumption that pictures are simply direct replicas of the appearances of real-world phenomena (see Krieger, 1984; Snyder, 1980; Wartofsky, 1984), there are, nonetheless, good reasons for believing that the recognition of manifest pictorial content is a prime example of analogical communicational processes (see Messaris, 1993, 1994).

However, the focus of this paper is not on manifest content but on the more implicit, indirect meanings of images: the tone or affect that a picture evokes, rather than the things it represents directly. In particular, this discussion will be concerned with the analogical implications of: (1) the composition of single images; and (2) the juxtaposition of images through editing. Because the scope of this paper is necessarily limited by space constraints, the examination of these issues will seek only to illustrate some major points, rather than to provide an exhaustive catalog of forms of visual analogy.

Visual Composition

As I am using the term here, analogy refers to cases in which a symbol reproduces a distinctive feature of its referent and, by virtue of that reproduction, comes to evoke the referent's qualities. There are at least two, relatively distinct aspects of visual composition in which analogical symbolism seems to play a major role: on the one hand, the evocation of meaning through the abstract qualities of shapes; and, on the other hand, control of the viewer's emotional engagement by means of point of view.

Abstract Shapes

Systematic exploration of the affective meanings of shapes (as opposed to the actual incidents or personalities depicted in a visual image) has a considerable history, both in the area of art and in that of advertising and other forms of deliberately manipulative imagery. Among painters in the Western fine-arts tradition, an especially noteworthy investigator of these matters was Georges Seurat, who eventually developed a detailed theory concerning the evocative properties of line and color (see Homer, 1964; Lee, 1990; Weale, 1982).

The explicit basis of Seurat's theory was the assumption that viewers respond to the abstract features of visual composition on the basis of unconsciously perceived analogies to elements of real-world experience. For example, Seurat believed that a wedge-like shape pointing toward the top of the canvas would evoke both dynamism, because of the association with the properties of sharp edges in knives or other implements, and buoyancy, because of the association with upward movement in general.

Thus, in his execution of scenes in which these qualities were an appropriate part of the tone he was trying to convey, he would incorporate upward-pointing wedge shapes in the composition even in places in which a more strictly naturalistic rendition would not have called for them. This practice is clearly evident in such paintings as "Le Cirque" (1891) and "Le Chahut" (1890), in which upward-pointing tapers are added to the facial features of a circus acrobat, in the former case, and a line of high-stepping dancers, in the latter.

Since the days of Seurat's experiments, this kind of compositional device has become a regular feature in certain areas of mass-mediated image-making, most notably, perhaps, in advertising. In particular, the idea that wedge-shaped forms evoke energy or dynamism has clearly taken hold among designers of print ads for sports-related products, in which it is quite common to encounter triangular logos, triangular frames, or other triangular design elements.

Not surprisingly, the evocative properties of these and other shapes have been tested by several researchers, with an eye not only on advertising uses but also on applications to industrial design (Espe, 1983). The work of these researchers supports the assumption that viewers respond in the expected ways to the abstract qualities of shapes even when these shapes are presented without any context. In other words, we have evidence here that analogy does indeed work.

Of course, it might be objected that the viewers in these studies are typically people with extensive prior experience of visual media and that it is this experience, rather than the real-world associations of shapes or other design elements, which has conditioned their responses to these devices. It is therefore worth noting that a major cross-cultural study of visual composition found strong evidence that certain aspects of composition -- curved vs. straight lines, for example, or symmetry vs. asymmetry -- are associated with similar connotations across a wide spectrum of unrelated cultures (Fischer, 1961; see also Hatcher, 1988).

Since these cultures did not share a common pictorial tradition, the assumption that what we are seeing here is a manifestation of the workings of analogy can perhaps be made more confidently in this case. In other words, it seems likely that these findings reflect a common response to certain basic visual dimensions in the experience of most or all human beings (cf. Bang, 1991).

Point of View

The second aspect of composition that will be examined here is point of view. The general principle here may be expressed as follows: By controlling the viewer's positioning vis-a-vis the characters, objects, or events in an image (including the image sequences of film or television), the image's producer can elicit responses which have been conditioned by the viewer's experience of equivalent interrelationships with real-life people, things, and actions.

This kind of analogical connection is probably most clearly evident in the well-worn cliche of filming someone from a low angle to make her or him appear more imposing, but the most frequent use of camera positioning as an analogical device is undoubtedly that which occurs when the distance (real or apparent) between the camera and its subject is employed as a means of modulating the viewer's identification or involvement with the characters or events on the screen.

In other words, here we are dealing with a variable which is in virtually constant use in many movies and TV programs and is, indeed, one of the principal visual means for such effects as heightening the intensity of a scene as it moves towards its climax, maintaining the viewer's sympathy with the hero and emotional distance from secondary characters, releasing the tension of a scene or of the movie as a whole following the resolution of the action, etc.

Because of the analogy between the role of camera-to-subject distance in such instances and the function of interpersonal distance as a regulator of intimacy and involvement in real-life social relationships, Meyrowitz (1986) has labelled this aspect of visual manipulation "paraproxemics."

Although it might seem that the devices encompassed by this label, i.e., such things as dramatic close-ups, zoom-ins to a significant object, camera pull-backs as a movie ends, and so forth, must be excessively obvious to most mature viewers, in fact there is evidence that even highly educated people with an interest in visual media, but no directly-relevant education or practical experience, are generally unaware of these kinds of things (Galan, 1986). This finding suggests that the area of paraproxemics would be a suitable target in any attempt at enhancing the visual literacy of members of the general public.

Image Juxtaposition

Editing Rhythm

Perhaps the most obvious locus of analogical signification in film and television is the area of editing rhythm. Consider, for example, the following: In a notable study of the formal characteristics of TV commercials aimed at children, Welch et al. (1979) argued -- with strongly supportive empirical evidence -- that the appeal to conventional conceptions of masculinity in commercials aimed at boys should be evident in such stylistic devices as fast editing and the use of straight cuts, while commercials for girls should be characterized by slower editing and relatively greater use of fades and dissolves. Here the meanings conveyed through the visual style -- speed and abruptness vs. smoothness and a more even pace -- are mere abstractions, without any necessary embodiment in the person of a fast-moving male or a gentle female.

It might appear that the ability to perceive an analogy of this sort, with such an attenuated relationship between the image and its meaning, must be a formidable intellectual task, requiring considerable prior experience in abstract reasoning. However, in a follow-up study to the one by Welch and her colleagues, Huston et al. (1984) found that even quite young children were able to infer the gender orientation of an ad on the basis of the kinds of abstract features mentioned above.

One possible way to look at this finding is as an indication of how thoroughly experienced in the "language" of television most young children are these days. It is also conceivable, however, that the ability to perceive such visual analogies is derivative of broader cognitive skills which are not specific to any particular mode of communication, since very similar analogical processes appear to operate in at least one other mode, music (see Meyer, 1956; also Kivy, 1988).

The use of editing to evoke such aspects of gender imagery as abruptness vs. smoothness may be seen as a specific application of a more extensive and frequently-encountered category of editing devices, having to do with temporal rhythm and its associated moods. The fact that editing rhythm can, in and of itself, affect a viewer's perceptions of the events or characters in a film or video sequence, making them appear more or less dynamic, powerful, etc., has been demonstrated systematically in comprehensive experiments by Kraft (1986) and Penn (1971); and, indeed, we should be surprised if it were otherwise, since that would mean that the innumerable editors who have used such devices have been laboring under a massive collective delusion. Although such uses of editing are extremely common, they are by no means the only forms of cinematic or video image-juxtaposition apparently based on analogy.

Analogical Juxtaposition of Images

A rather different form of analogical editing is best introduced through an example. Towards the end of Kon Ichikawa's "The Makioka Sisters" (a Japanese film made in 1983), there is a scene in which an unmarried woman, who has endured a series of disappointing attempts at third-party match-making, finally meets a suitor she finds attractive. As she faces this man for the first time, Ichikawa's camera goes from a shot of her to a shot of wind-ruffled foliage -- with red colors prominent -- in the window behind her.

By itself, this latter shot can be seen as an extension of the analogical principles discussed earlier in connection with Seurat and the composition of individual images: The shot's vibrant movement and its warm color are both fairly straightforward analogues for the emotions that this scene was presumably designed to convey. However, the presence of the editing adds an element that is absent from the case of single images. Confronted with a juxtaposition of this sort, a viewer must not only be sensitive to the analogical implications of individual images but must also be able to link two (or more) images on the basis of those implications.

In Ichikawa's film, the implied analogy is the sole focus of the juxtaposition between the two images, and a similar singularity of purpose has been characteristic of some of the better-known instances of analogy-based juxtaposition in the history of film editing -- e.g., Eisenstein's cross-cutting between striking workers being massacred by government troops and animals being butchered in a slaughterhouse (in "Strike," 1925) or Alfred Hitchcock's cross-cutting between a sex scene and exploding fireworks (in "To Catch a Thief," 1955).

Perhaps more frequently, however, analogical connections tend to be embedded less obtrusively in editing that also serves a narrative function, as is the case in two of the most-analyzed examples of this form of image juxtaposition: the direct cut from a burning match to a fiery desert sunrise, in David Lean's "Lawrence of Arabia" (1962); and the transition from a proto-human throwing a bone/axe into the air, to a space-station in orbit above the Earth, in Stanley Kubrick's "2001: A Space Odyssey" (1968).

As Clifton (1983) has argued, this kind of merging of analogical and narrative elements may make the analogy less obvious to viewers than it is in cases of purely analogical juxtaposition, and there is indeed some evidence that the ability to discern the extra-narrative implications in editing combining analogy and narrative may require special visual-literacy skills (Messaris & Nielsen, 1989).

Editing based only on analogy, without a narrative component, has become quite rare in mainstream fiction film and television, but, as Prince (1990) has pointed out, it appears to be gaining popularity in some forms of advertising. In particular, it has become a staple of political ads and videos, such as Ronald Reagan's 1984 campaign film, "The Presidency" (see Morreale, 1991, for a detailed analysis).

Juxtaposition based on visual or conceptual analogy between two images is also very common in print advertising. For example, automotive advertisers have featured their products in association with lions (a Toyota ad emphasizing power and dominance over the competition), ice skaters (an Oldsmobile ad emphasizing smooth performance and elegant styling), jet airplanes (a Dodge ad emphasizing speed and power), eagles (a GM ad emphasizing freedom and ease of travel), and tigers (the well-known Exxon series).

Furthermore, there is another, related category of print advertising that also makes use of analogy but presents it in a distinctly different form. A case in point is a National Dairy Board ad in which a glass of milk emerges out of a peeled banana: The object is to suggest nutritional equivalence, but this analogy is suggested through a merging or blending of the two foods, rather than a side-by-side pairing. As Kaplan (1990, 1992) has suggested, this kind of blending of the two terms of the analogy can be seen as a visual equivalent of the linguistic metaphor. (By extension, the other forms of analogical juxtaposition examined here could be thought of as visual similes.)

Conclusions

We have seen that analogical implications of various kinds are central ingredients of a wide variety of visual devices, including: graphic composition in still images (shapes, lines, colors, etc.); camera placement vis-a-vis the subject of an image; rhythm in film or TV editing; and juxtapositions of visually or conceptually related images in film, television, or print. The more general point that emerges from this discussion is that the ability to discern an analogical connection between an image and its referent, or among two or more images, is an important component of the set of cognitive skills comprising a viewer's visual literacy.

This conclusion also suggests an intriguing corollary: Could it be that, in learning to make sense of visual communication, we also acquire an enhanced facility in analogical thinking (Whittock, 1990)? A parallel connection has been explored by Salomon, who examined the possibility of a causal link between visual literacy and another important area of cognition, spatial intelligence.

The empirical evidence on that specific link is contradictory and inconclusive (in addition to Salomon, 1979, see Forbes & Lonner, 1980, and Wachtel, 1984), but it is probably fair to say that Salomon's question has not yet been addressed directly, and, in any event, there appears to be no empirical research, whether direct or otherwise, on the issue that concerns us here, i.e., the possibility of a similar causal connection between visual literacy and analogical thinking. These questions are good candidates for further investigation, and it is hoped that the present paper has contributed to suggesting some directions for research along these lines.

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Avatars, Affordances, and Interfaces: Virtual Reality Tools for Learning

Hilary McLellan

Introduction

Virtual reality technology offers the possibility of becoming immersed in and interacting with a computer-based environment that engages visual, auditory, and tactile perception. Building on the fields of computer graphics, computer-aided design, human-computer interfaces and simulation, virtual reality was devised to enable people to deal with information more easily. Virtual reality is potentially an extremely versatile and powerful creative tool.

Virtual reality is currently in the very early stages of development. The practical potential of this technology is still under exploration, but it appears to offer important educational potentials in the following areas: (1) modeling complex phenomena, (2) project planning and design, (3) the design of interactive forms of entertainment and learning, (4) communication and control at a distance, (5) virtual field trips, and (6) the design of experiential learning environments. In addition, virtual reality offers many possibilities as a tool for nontraditional learners, including the physically disabled and those undergoing rehabilitation who must learn (or relearn) communication and psychomotor skills. Virtual reality offers applications in many fields, including robotics, medicine, rehabilitation, scientific visualization, aviation, business, architectural and interior design, city planning, product design, military training simulations, law enforcement, entertainment, the visual arts, music, dance, communication and collaboration at a distance, and education.

In thinking about virtual reality, immersive technologies involving wired gloves and head-mounted displays first come to mind. But in addition to immersive VR, there are several other types of virtual reality, including mirror worlds, desktop VR (also known as 'through the window VR'), cab environments, Waldo World VR, and the CAVE.

In this paper, the focus will be on three inter-related VR design topics: (1) avatars; (2) affordances; and (3) interfaces. These topics are particularly relevant to visual literacy.

Avatars

Avatars are agents that appear in a virtual world representing the user. For example, in many VR systems, an image of a hand appears to represent the user's hand encased in a wired glove. Thus the user can see where her hand is in relation to the other objects in the virtual world. More sophisticated avatars can be seen in virtual reality games such as *Dactyl Nightmare* and *Legend Quest*.

To understand what an avatar is, think of Rene Magritte's painting of a pipe that included the words "Ceci ce n'est pas un pipe" (This is not a pipe). Magritte was playing with our understanding of reality and representation. With the introduction of avatars in virtual reality, representations (avatars) become dynamic and seamlessly linked to reality, in real time. With virtual reality, reality and representation are ever more closely intertwined.

The Legend Quest game hints at just how closely reality and representation can become merged in virtual reality. Based upon the Dungeons & Dragons role-playing game, Legend Quest uses four immersive virtual reality systems networked together so that four players share the same virtual world, which includes a forest, a castle, and a multilevel dungeon. Players are able to see and speak with each other. A special voice input/output system allows them to speak in the voice of the character they have chosen to play. Thus the avatar is not only visual but auditory. Each player sees and hears a representation of his or her character within the virtual world. There are eighteen possible characters. The possibilities are limited to an Elf, Dwarf, or Human of either sex who may be a Wizard, a Warrior, or a Thief. Every aspect of character has disadvantages as well as advantages, so a team with the most varied aspects and talents is the most likely to succeed in the quest. All four players are on a quest together, and the dynamics of the game create the most success when they cooperate with each other. The goal of the game is to master ten challenges while not dying in a hazard or from foul play. The programming of the monsters in the dungeon uses artificial intelligence that allows them to learn from experience and make countermoves. Winning is not easy (Hamit, 1993).

Another example of an avatar comes from Waldo World VR applications. This type of virtual reality is a form of digital puppetry involving real-time computer animation. The name "Waldo" is drawn from a science fiction story by Robert Heinlein (1965). Wearing an electronic mask or body armor equipped with sensors that detect motion, a puppeteer controls, in real-time, a computer animation figure on a screen.

One example of a Waldo World VR application is the Virtual Actors™ developed by SimGraphics Engineering. These are computer-generated animated characters controlled by human actors, in real-time. To perform a Virtual Actor (VA), an actor wears a "Waldo" which tracks the actors' eye brows, cheek, head, chin, and lip movements, allowing them to control the corresponding features of the computer-generated character with their own movements. The animated character is a form of avatar that makes subtle movements and expressions based on the corresponding gestures and expressions of the puppeteer. Here the avatar is at center stage. A hidden video camera aimed at the audience is fed into a video monitor backstage so that the actor can see the audience and "speak" to individual members of the audience through the lip-synced computer animation image of the character on the display screen. This digital puppetry application is like the Wizard of Oz interacting with Dorothy and her companions: "Pay no attention to that man behind the curtain!"

The science fiction novel *Snow Crash* by Neal Stephenson plays with the notion of avatars in the Metaverse, the networked virtual world where much of his story takes place. In the Metaverse, it is possible to have an expensive, custom-designed avatar that is capable of subtle facial expressions or, for the less affluent, it is possible to get a mass-produced avatar from someplace like Walmart. These mass-produced avatars come with model names. For a woman, the low-cost avatar goes by the name "Brandy." Here is Stephenson's description: "Brandy has a limited repertoire of facial expressions: cute and pouty; cute and sultry; perky and interested; smiling and receptive; cute and spacy. Her eyelashes are half an inch long, and the software is so cheap that they are rendered as solid ebony chips. When a Brandy flutters her eyelashes, you can almost feel the breeze" (p. 37). The male counterpart is a "Clint." A Clint avatar "is just the male counterpart of Brandy. He is craggy and handsome and has an extremely limited range of facial expressions." There is also a low-cost "Avatar Construction Set" for the more creative.

In the Metaverse, avatars offer certain advantages: "Your avatar can look any way you want it to, up to the limitations of your equipment. If you're ugly, you can make your avatar beautiful. If you've just gotten out of bed, your avatar can still be wearing beautiful clothes and professionally applied makeup" (p. 36). Celebrities can spend a night on the town in the Metaverse without fear of robbery, violence, or bother from over-enthusiastic fans.

Affordances

Let's now turn to the second design topic, affordances. Psychologist J.J. Gibson (1986) has proposed a theory of ecological psychology that emphasizes human perception of the environment, specifically the psychology of the awareness and activities of an individual in an environment. In Gibson's theory, "affordances" are the distinctive features of a thing which help to distinguish it from other things that it is not. Affordances help us to perceive and understand how to interact with an object. For example, a handle helps us to understand that a cup affords being picked up. A handle tells us where to grab a tool such as a saw. Affordances provide strong clues to the operations of things.

Affordance perceptions allow learners to identify information through the recognition of relationships among objects or contextual conditions. Affordance recognition must be understood as a contextually sensitive activity for determining what will (most likely) be paid attention to and whether an affordance will be perceived. The ability to recognize affordances is a selective process related to the individual's ability to attend to and learn from contextual information.

Gibson's model of ecological perception emphasizes that perception is an active process. Gibson does not view the different senses as mere producers of visual, auditory, tactual, or other sensations. Instead he regards them as active seeking mechanisms for looking, listening, touching, etc. Furthermore, Gibson emphasizes the importance of regarding the different perceptual systems as strongly inter-related, operating in tandem. Gibson argues that visual perception evolved in the context of the perceptual and motor systems, which constantly work to keep us upright, orient us in space, enable us to navigate and handle the world. Thus visual perception, involving head and eye movements, is frequently used to seek information for coordinating hand and body movements and maintaining balance. Similar active adjustments take place as one secures audio information with the ear and head system.

Gibson hypothesized that by observing one's own capacity for visual, manipulative, and locomotor interaction with environments and objects, one perceives the meanings and the utility of environments and objects, which Gibson calls "affordances." Following from this, one can predict that the ways in which the user is allowed to interact with virtual things in a computer-generated world will determine how well he or she can understand them. Gibson's ideas highlight the importance of understanding the kinds of interactions offered by real environments and the real objects in those environments. This knowledge from the real world can inform the design of interactions in the virtual environment so that they appear natural and realistic, or at least meaningful.

How does this relate to virtual reality? According to Rheingold (1991), a glove that controls a virtual object would be an "affordance," a means of literally grabbing on to a virtual world and making it a part of our experience. Rheingold explains: "By sticking your hand out into space and seeing the hand's representation move in virtual space, then moving the virtual hand close to a virtual object, you are mapping the dimensions of the virtual world into your internal perception-structuring system" (p. 131). So the image of a hand in a virtual world is both an affordance and an avatar.

Virtual reality pioneer Jaron Lanier (1992) has commented that the principle of head-tracking in virtual reality suggests that when we think about perception -- in this case, sight -- we shouldn't consider eyes as "cameras" that passively take in a scene. We should think of the eye as a kind of spy submarine moving around in space, gathering information. This creates a picture of perception as an active activity, not a passive one, in keeping with Gibson's theory. And it demonstrates a fundamental advantage of virtual reality: it facilitates active perception and exploration of the environment portrayed.

Anthropologist Lucy Suchman (1988) has said, "Every human tool relies upon, and deifies, some underlying conception of the activity that it is designed to support, as a consequence, one way to view the artifact is as a test on the limits of the underlying conception" (p. 3). The underlying conception is based upon the affordances the tool offers. Virtual reality is no exception. We expect that when the representation or avatar of our hand encounters a wall, it will be afforded resistance; we don't expect to be able to walk through walls. Since virtual reality is a representation of some reality, we expect it to offer the same, or at least comparable, affordances as the real world it imitates.

Stephenson's science fiction novel *Snow Crash* provides the most intriguing examination of design issues related to affordances in virtual reality to date. In Stephenson's story, the main character, Hiro Protagonist is a man of many talents. He is "the last of the freelance hackers." He is also "the greatest sword fighter in the world." In addition, he gathers and sells information. His avatar in the virtual world of the Metaverse is represented with swords. Hiro carries swords in real life, too; they are family heirlooms. What happens in virtual reality when there is a sword fight and someone's virtual legs are hacked off? This presents a design problem. Stephenson describes the aftermath of a sword fight:

> The [man] lies cut in segments on The Black Sun's floor. Surprisingly (he looks so real when he's in one piece), no flesh, blood, or organs are visible through the new cross sections that Hiro's sword made through his body. He is nothing more than a thin shell of epidermis, an incredibly complex inflatable doll. But the air does not rush out of him, he fails to collapse, and you can look into the aperture of a sword cut and see, instead of bones and meat, the back of the skin on the other side. It breaks the metaphor. The avatar is not acting like a real body. It reminds all The Black Sun's patrons that they are living in a fantasy world. People hate to be reminded of this (p. 103).

So what happens to restore the metaphor, so that it meets the virtual traveler's expectations in terms of affordances? Stephenson explains:

> ...the first thing that happens, when someone loses a sword fight, is that his computer gets disconnected from the global network that is the Metaverse. He gets chucked right out of the system. It is the closest simulation to death that the Metaverse can offer, but all it really does is cause the user a lot of annoyance.

> Furthermore, the user finds that he can't get back into the Metaverse for a few minutes. He can't log back on. This is because his avatar, dismembered, is still in the Metaverse, and it's a rule that your avatar can't exist in two places at once. So the user can't get back in until his avatar has been disposed of.
>
> Disposal of hacked-up avatars is taken care of by Graveyard Daemons, a new Metaverse feature that Hiro had to invent. They are small lithe persons swathed in black, like ninjas, not even their eyes showing. They are quiet and efficient. Even as Hiro is stepping back from the hacked-up body of his former opponent, they are emerging from invisible trapdoors in The Black Sun's floor, climbing up out of the nether world, converging on the fallen businessman. Within seconds, they have stashed the body parts into black bags. Then they climb back down through their secret trapdoors and vanish into hidden tunnels beneath The Black Sun's floor (p. 102-103).

This is an elaborate and fanciful vision of how continuity and affordances can be restored in virtual reality. However, there are already some comparable situations in existing virtual reality systems where the design metaphor must be readjusted. For example, in *BattleTech* -- a VR entertainment system for multiple players -- players who lose their vehicles to enemy firepower get wafted to a new one so they can play out their game time, even after they crash. This is a way of upholding the metaphor and maintaining continuity while at the same time giving players their full money's worth. The players pay for each game, so they get to play out the simulation during the entire time they have paid for, even if they lose a round.

In his more recent work on VR as a form of scientific visualization for planetary exploration, Michael McGreevy (1993) of the NASA Ames Lab has taken up the Gibsonian idea that the environment must "afford" exploration in order for people to make sense of it. McGreevy has linked Gibson's concept of affordance to the idea that people can begin to learn something important from the data they have retrieved from planetary exploration by flying their points of view through the images themselves. McGreevy (1993) explains: "Environments afford exploration. Environments are composed of openings, paths, steps, and shallow slopes, which afford locomotion. Environments also consist of obstacles, which afford collision and possible injury; water, fire, and wind, which afford life and danger; and shelters, which afford protection from hostile elements. Most importantly, environments afford a context for interaction with a collection of objects" (p. 87). As for objects, they afford "grasping, throwing, portability, containment, and sitting on. Objects afford shaping, molding, manufacture, stacking, piling, and building. Some objects afford eating. Some very special objects afford use as tools, or spontaneous action and interaction (that is, some objects are other animals)" (p. 87).

McGreevy (1993) points out that natural objects and environments offer far more opportunity for use, interaction, manipulation, and exploration than the ones typically generated on computer systems. Furthermore, a user's natural capacity for visual, manipulative, and locomotor interaction with real environments and objects is far more informative than the typically restricted interactions with computer-generated scenes. A virtual world may differ from the real world, but virtual objects and environments must provide some measure of the affordances of the objects and environments depicted (standing in for the real world) in order to support natural vision more fully.

Interfaces

Let's now turn to the third design topic, interfaces. Interfaces for both input and output, link the user to the virtual world which exists only digitally. Interface devices such as the glove and the full-body input devices offer far more than the convenience of being able to manipulate virtual objects by reaching out and picking them up. So the image of a hand in a virtual world is an affordance and an avatar, linked directly to an interface device: the wired glove. Interface devices such as the wired glove are very important for creating a sense of presence and establishing a feel for the spatial dimensions of the virtual world.

According to Ellis (1992), a large part of our sense of physical reality is a consequence of internal processing rather than being something that is developed only from the immediate sensory information we receive. Our sensory and cognitive interpretive systems are predisposed to process incoming information in ways that normally result in a correct interpretation of the external environment, and in some cases they may be said to actually "resonate" with specific patterns of input that are uniquely informative about our environment.

These same constructive processes are triggered by the interfaces used to present virtual environments. However, in these cases the information is mediated through the interfaces, including the display technology. The illusion of an enveloping environment depends on the extent to which all of these constructive processes are triggered. This is related to the continuity of the affordances between the real world and its electronic virtual surrogate. This includes the options we have for interfacing with the virtual world, and these options have serious limitations, as Brenda Laurel (1992) points out.

According to Laurel, there is a serious navigation problem n virtual reality, limiting how designers can give people the sense that they're moving through large virtual spaces. The most common way to do this is by pointing a finger enclosed in a wired glove and "finger flying." In the real world, we walk, we don't point a finger and expect to move.

Pointing and flying don't give the user the kinesthetic satisfaction of being able to move all over the place. Some developments, such as Fake Space Labs' BOOM visual display and the University of North Carolina's treadmill, work toward providing partial solutions to this problem, but a fully adequate solution remains to be discovered. No one has yet come up with the winning answer to the question of virtual locomotion.

Laurel points up another important issue related to multisensory interfaces in virtual reality: "sensory combinatorics." According to Laurel, "We're working in a multisensory medium: we're trying to cram as many senses as we can into telepresence and virtual environments. How do these senses interact with each other? How do you design for this medium?" (p. 291). This notion of sensory combinatorics, then, concerns putting sensors together properly in a multisensory environment.

One example of the design potential of combining sensory interfaces concerns the role of audio in virtual reality. Laurel explains that audio affects the perception of video: "In the computer game business, we learned that high-resolution audio caused people to report that the game's graphics were higher resolution. It doesn't work the other way though; really high-resolution video does not cause people to report that the little beeps on their PC are suddenly rich, full-bodied sounds. Something interesting is going on here. In one case, audio pulls video along, and in the other, a disparity shatters the illusion" (p. 289).

According to Laurel (1992), "audio pulls us along in a dimension that we might call "involvement," or the dimension of "constructive involvement": pulling stuff out of the imagination of your user to achieve a very deep level of participation. It turns out that audio is a whole lot better at that, in general, than video" (p. 290). When you create an audio-intensive environment, the effect tends to work better, although there is no guarantee. Laurel advises that three-dimensional audio is much better than video at creating a sense of real space.

Conclusion

This paper has focused on three important design issues in virtual reality: avatars, affordances, and interfaces. As we have seen, these three design themes are closely interrelated. They deal with the changing inter-relationship between reality and representation that virtual reality compels us to deal with. Every technology has forced a reconsideration of this issue, but none more profoundly than virtual reality.

In exploring these design themes, the focus has been upon examples, including fictional examples from the science fiction novel *Snow Crash*. Design in virtual reality is almost completely new. In thinking about design for this new medium, past technologies must be considered, together with new visions. Jerome Bruner (1990) proposed a bipolar model of storytelling: paradigmatic storytelling ("just the facts") and narrative storytelling. Designers exploring the potential of the new medium, virtual reality, need to consider both kinds of storytelling in order to get the technical specifications right while at the same time understanding what the virtual world really feels like to the user. Neal Stephenson has referred to this second kind of understanding as "condensing fact from the vapor of nuance."

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Teaching a Semiotic Analysis of Television Commercials to Chinese College Students

Ellen Elms Notar

A return visit to the Peoples Republic of China to once again teach college students in Beijing,provided an interesting pilot research experience. Funded by a faculty exchange grant from the United States Information Agency the assignment was to teach "American Studies" through the Foreign Language Department of The Peoples University of China in Beijing. This topic included the history of American education and the use of American English. Upon arrival at the university the director of the department asked whether it would be possible to add a series of additional lectures or discussions with the students. This required some thought.

The topic became very clear after a long walk outside the University's campus and after turning on the televison set in my room, which was shrouded with a red velvet cover, and displayed hundreds of advertisements in living color. Capitalism was raging in 1992 Beijing!. What a shock!.

A prior visit to China in 1985 was quite a different place. Beijing was still very conservative. The stores for the Chinese were stocked with only the basic necessities of life, in sharp contrast to the Friendship Stores for foreign tourists, run by the government, which contained a wide variety of goods from China and around the world. These stores were not open to most Chinese and were still very limited in their offerings by foreign standards. Today, not only is the variety of goods and services available to the urban Beijing Chinese equal to almost anywhere in the world, but stores, shops, street stalls and services are available everywhere in the city. The 1992 Chinese male student was dressed in blue jeans, T-shirts screaming Chicago Bulls and the Simpsons; the female college students were in mini-skirts and wearing make-up. English has now completely replaced Russian as the second language for school children, starting in third grade.

The walk of mind-boggling recognition that not only had the Chinese entered the world of aggressive capitalism, but they were enjoying the changes and saw the ties to their own communist philosophy as part of the "economic reforms". Turning on televison that evening was even more of a shock. In 1986 T.V. programming was limited to a few hours in the evening, usually black and white programs with a heavy emphasis on Chinese government "thought and moral education". Summer 1992 brought quite a different picture to the screen. A great diversity of color television programming filled five or six channels broadcasting most of the day and evening. A day's program offerings included instructional television courses for adults and children, health shows, Chinese soap operas, folk art performances, Chinese classical operas, game shows, sporting events, variety performances, children's cartoons, a British detective series, feature films, and a forty part series "Flying Fox on Snow Mountain" adapted from Jin Yongs' two kungfu novels.

One of the most fascinating aspect of the proliferation of Chinese television was the accompanying advertisements which were shown in 4-6 minute blocks of time so as not to interrupt the programming. Normally a sophisticated or jaded American audience would take this time for a trip to the kitchen or whatever. For the Chinese television viewer this is another total aspect of the programming presented. Advertising is a part of the entire event , equally as entertaining as the programs, and filled with new information - a world of consumer information. The decision was made; I would teach my young students a semiotic analysis of television related to commercial messages, a topic which had been of interest for several years.

Developing Cognitive Filters

It was believed that assisting students to develop cognitive filters to create understanding should enable them to understand the intent of advertisers. Semiology, the science of signs, is concerned with how meaning is generated in "texts", films, television, and other works of art. The interest in signs and their meaning has a long history. The Swiss linguist Ferdinand de Saussure (1857-1913) and his "Course in General Linguistics" suggested the possibility of a semiological analysis. Saussure divided the sign into two components, the signifier, or sound image, and the signified, or the concept. An American, Charles Saunders Pierce (1839-1915), built upon this notion by examining the aspects of signs as iconic, indexical, and symbolic dimensions. The icon is something we can see, the indexical is something we can figure out, and the symbol is something which must be learned.

A basic concern is how meaning is generated and conveyed, with particular reference to the commercial message appeals conveyed in television. Thus, the television is our "text" for purposes of analysis. Unlike the United States, where people have become stoutly resistant to advertisement because we live in a blizzard of messages, the average Chinese viewer is relatively naive regarding the use of commercial messages which foster, even create a materialistic orientation. The use of effective advertising was understood very clearly by the late media analyst, Marshall McLuhan. He states in his book Understanding Media, "The continuous pressure is to create ads more and more in the image of audience motives and desires" (1964).

Commercial T.V. is predominately governed by an aesthetic of realism, of images and stories which fabricate the real and attempt to produce an effect of reality. It is subordinate to narrative codes and to story telling. Producers believe audiences are most entertained by stories, by narrative with familiar and recognizable story lines, characters, plots and messages. Critics of television like to tell us that t.v. is the ultimate black hole, pure noise, and that all meaning and messages are absorbed in a whirlpool...only discrete images glow and flicker. This is simply not true - people watch and model their behavior, style and attitudes on T.V. images. Would these Chinese students understand this, and are they being caught up in this whirlpool? Would it be able to assist them to sort the wheat from the chaff and enjoy, yet become criticial viewers of this new powerful force in their lives?

Mass communication research has established that frequently watched shows and t.v. ads alter viewers' agendas of what issues, topics and products are important and salient. The Chinese have a long history of iconic-symbol systems and the meaning of television rests on a set of symbolic conventions. Therefore, the symbolic conventions can be manipulated toward a variety of ends. Advertising uses a combination of psychological appeals which are need-based in combination with the symbolic codes of the culture or target audience. Market analysts select samples of the target audience to measure appeal and comprehension. Corrections are made to insure effectiveness. These analyses are in the process of being conducted on what may be the world's largest consumer market.

Methodology

Critical literacy in an image driven culture requires - yes, demands learning how to read images critically and how to unpack the relations between the images, text, social trends and products in a commercial culture. Ads are intented to sell lifestyles. Reading of ads helps individuals to avoid or at least resist manipulation. In James Lull's recent book (1991), China Turned On, he discusses the historical perspective of the manipulations of culture. Chinese emperors throughout the centuries had the habit of destroying all vestiges of cultural life that preceeded their dynasties' rise to power. This cultural extermination, including the burning of books of Confucious, was accomplished in the name of cultural and political unity. The emperors believed that divine intervention was prompting them, and each dynasty tried to establish or maintain a single cultural system (ru) and declared that the ru of the previous dynasty was simply false. In modern times, the classic stories of the Chinese operas have been rewritten to reflect the political climate and values of Communism - the new ru.

It would appear that the

challenge for Chinese leaders today is the management of the culture of television. Television invades the society, not only from within but from the world outside. It is filled with dense information and images which are extremely difficult to edit and manage. Images which tell us much through hairstyles, living conditions, foods, gestures and indications of the products which are desirable to complement our lives.

The decision was to use a framework of analysis developed by the Harvard psychologist Henry A. Murray, whose team had constructed a taxonomy of needs. Murray's list had been used by a number of projects and the study which seemed most relevant was David C. McClelland's extensive examination of the need for achievement. In his book The Achieving Society,(1980) McClelland demonstrated that a people's high need for achievement is predictive of later economic growth. Although access to all the literature which would have been available in the United States was impossible, it was possible to reconstruct the fifteen basic appeals used by Murray.

In preparation for teaching the unit, careful observations of Chinese television were made for approximately one week, recording the type of appeal which observed, evidence of symbols, the product being marketed, the timing of the ad, and the program which preceeded and the program following the ads. T.V. advertising in the PRC appears to be developing into a carbon copy of advertising in the U.S., Taiwan, and Hong Kong. Messages are approximately 12-to 15 seconds in length, the audio is louder than the actual programming and the message appeals are repetitive, being shown over and over again within a certain time period.

Murray's list of appeals which was introduced to my students included : Need for Sex, Affliation, Nurture, Guidance, Aggression, Achievement, Domination, Prominence, Attention, Autonomy, Escape, Safety, Aesthetic sensations, Curiosity, and the basic physiological needs of food, clothing and shelter.

The first session in which these ad appeals were identified and discussed with the students, an element of healthy skepticism was apparent. Yes, they had seen much advertising on T.V., but surely ads were not organized, and certainly they did not contain hidden messages. Assigning homework for the weekend allowed them to analyze the commercials. They were asked to collect the following: the name of the product, or public service announcement, the length of the message, the time of the day or night, the programs immediately preceeding the commercial and following the commercial breaks, and to identify what they believed to be the main "appeal".

Astonishment is the best word to describe their reaction the following week. They were shocked at their own findings and were eager to discuss this further and analyze these emotional appeals being presented. Sexual message were clearly conveyed in "signs" and symbols. Some of the students viewed this as "sinister manipulation" and articulated the "capitalistic thrust" of this into Chinese society. Others noted the complexity, and that often within one ad several appeals were tied together within multiple symbols. Several of the students commented on the lack of older people in the advertising, which is counter to Chinese cultural norms, where the older person is highly respected. They were hooked! It would be fascinating to learn and enjoy this analysis together. They would be able to inform this Westerner of symbolic meanings which might not be apparent or obvious.

An important aspect of the sign as a symbol, and the fact that the meaning it conveys must be learned is that the symbol is not arbitrary, it is a part of the culture. For the purposes of this brief article, let's use the simple example of a car. The car Toyota, conveys a very different concept than the car Mercedes. Although both would like to distinguish their product as one of quality, the Mercedes carries very different concepts of status, affluence, and longevity - even in China!

What makes all this more complex is the fact that people are not consciously aware of the "codes", and we must analyze this to crack the code. Umberto Eco (1976), the distinguished Italian semiologist indicates the "aberrant decoding...is the rule in the mass media". As Eco puts it, different people bring different codes to a given message: a person's ideological, ethical, and psychological attitudes, tastes, and value systems impact upon the meaning generated. Advertisers are very aware of the power of understanding these symbols and codes and intentionally plug into the appeals which they are able to generate.

Discussions at this point required an analysis of the positive aspects of television and commercial messages. It is important to assist these young viewers to understand that commercial messages serve to educate us, to actually assist us in the decisions regarding product purchases, and to inform them of the costs of producing these messages. Therefore the discussion was broadened to include the use of the camera; angles, editing and lighting technigues, issues of gender presentations, humor and attention gaining devices.

Student Data Collection

Thirty six undergraduate students maintained logs indicating the programs which surrounded the block of advertising, the number of ads per block, type of appeal(s) presented, and the product. Blocks of advertising contained approximately 22-27 ads in a four to six minute sequence.
Using Murray's 15 appeals as our "code" to crack, we analyzed the data collected by the students' observations which consisted of approximately 900 advertisements. Students perceived the symbols indicated the following needs' messages.

Thirty-three per cent of their observations indicated a "sex" appeal, twenty-six per cent of the ads appealed to the need for personal achievement, twenty-three percent gave information on nurturing, and fifteen per cent of the ads yielded guidance information.

Other appeals were scattered throughout the ads, without any significant correlation or statistical significance. Students were able to discuss the particular symbols which conveyed to them an "appeal". Sexual messages were presented with close-up shots of lips, mouths, and elegant presentations of hair, eyes, and the female body, and were used to sell furniture, appliances, beer, cigarettes, cosmetics, Tang, beauty soaps, shampoos, and contact lenses. Achievement appeals used the devices of athletic heroes, film starts, and video stars to sell health drinks, juices, air conditioners, Isuzu automobiles, Yamaha stereo equipment, and Xing Fu Motorcycles.

Appeals for nurturing used babies, older people giving valuable information, and doctors offering medical advice to young families. These ads were always presented in the context of a lovely setting of an office, house or apartment furnished with modern furniture, appliances, lighting and a sense of spaciousness. These are not attributes of most Chinese housing. This appeal for nurturing sold ice cream, cookies, vitamins, contact lenses, Heinz baby food, toothpaste and Nestle's chocolate drink.

Guidance was most often given by athletic stars, medical doctors, and older persons, usually in the context of vitamins, healthy foods, safety devices,insect repellents, and rodent control.

Discussion and analysis

Television is a dynamic force which has changed our interactions with the world. These Chinese students knew all about the Los Angeles riots, who and what had won the Academy Awards and the big name athletic stars in the U.S. and Europe. Ads were clearly selling a new lifestyle to the world's largest population concentrated in one country. People were shown in elegant surroundings of apartments and California-style homes, not the type of housing that one sees in China. The ads were directly related to the expected audience, i.e., toy ads and cereals and vitamins were attached to programs for children where a parent might also be watching. Women and men students noted with some dismay a very new presentation of the young Chinese woman as a "model- looking housewife". Although many of the young Chinese women dress very fashionably,staying at home as a housewife is simply not done in China in the cities unless a woman has retired. The very concept of a "housewife or homemaker" required a great deal of explanation. Attempts to define this term as a woman who worked in the home and not outside of the home met with their consistent response," yes, all women and men do this, but what do they do for a living?" Students decided that this must be the influence of the Japanese in the development of these ads since in the Japanese culture a married woman with a child would stay home to "save face" for a man -" a very old fashioned idea", they said.
Chinese college educated women see themselves as fiercely independent, thus this type of advertising was actually offensive to many of the students.

Research points to a relationship between televison viewing and the acceptance of more stereotypic conceptions about gender roles(Morgan, 1982, 1987). Studies by Morgan and Harr-Mazar (1980) found that television cultivates attitudes about when to form a family and how many children to have. Studies of T.V. impact on U.S. audiences are hampered because it is very difficult to find audiences in the U.S. who have not been exposed to television. Although the Chinese students had been exposed to t.v., they are relatively novice viewers, and it appeared that their ability to analyze what they were seeing was becoming for them, during the course of the seminar, more and more critical.

Student discussions centered around conventional persuasion paradigms which suggest that commercials provide information so viewers can learn about products, purchase them and then consume them. Social learning theory indicates that behaviors seen in commercials can be modeled, leading to greater consumption (Bandura,1971). Cognitive development theory predicts that youth can understand the advertising process, learn about the appeals used in the commercials and eventually be able to "vaccinate" themselves by resisting their persuasive tactics with a healthy skepticism (Ward, Wackman & Wartella, (1977).

Summary

Each week during this visit to China, the English language newspaper, China Daily, was well as Xinhua and other government-run newspapers ran articles and editorials commenting on television and its use for education, "moral development" (translate politics), and entertainment. The Chinese government requires 6.7% of all programs being broadcasted provide for children's needs, and they appealed for an increase in quality children's programming. Colleagues at Peoples University and at Beijing University were unaware of anyone teaching Chinese students critical viewing or semiotic analysis techniques, although business departments at both universities taught courses in how to write and produce advertising.

Teaching literacy today must include the teaching of visual symbols systems, a language which transcends the verbal and written, but can be manipulated and amplified across the world. These are important global skills. Tools to reach students, generate interest in a common dialogue, and educate and inform them regarding the power of meaning making in the new technologies.

Chinese students indicated they would never be able to view commercial messages again without an awareness of the techniques or appeals being used to entice them. Numerous letters from them indicating that they continue to "analyze t.v." have arrived over the last year. It would appear that there is a need to teach our students, wherever they are, to become critical consumers of this powerful technology. A plan to return to the Peoples Republic of China in the very near future and to continue to pilot research with a formal instruction of semiotics is in process. Several educational colleagues in China have indicated they are considering following critical viewing skills be encompassed in the curriculum for even younger children by helping them to evaluate, understand and manage their own viewing. Teaching them about the business of television, the purposes, and the manipulative devices and strategies as well as the very positive attributes such as the artistic and technical elements of this medium. Relating this visual literacy to the elegant tradition of storytelling in Chinese literature, music and art, will create a new uniquely Chinese cultural media literacy.

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The Motivational Effect of Televised Instruction on Teacher Directed Science Learning

Indrani Ganguly

Introduction

The degree to which students are motivated to learn is a major concern of those interested in improving science education. Broadly considered, motivation is the process of arousing, sustaining, and regulating activity, a concept limited to some aspect such as the energetics of behavior or purposive regulation (Elliott, 1988). The recommendation of the National Science Board Commission of Precollege Education (1983) states:

If America were to achieve world leadership in mathematics, science and technology education by 1995; two key answers to the present problem would be: ***time-on-task*** and ***motivation***.

According to the report, although the Japanese school system constructed in 1945 was closely modeled on the U.S. goal of universal education, the standard of performance of Japanese pupils has gone far ahead of their American counterparts. Japanese school systems put a high priority on mathematics and science education from the earliest grades. A typical Japanese secondary school graduate will spend about three times as many hours in science as a U.S. student who completes four years of science in high school.

The above report of the National Science Board Commission also appraised the motivational advantages that can be brought into education through the use of technological incentives. In particular, conference members were concerned that closed-circuit television, video, and other such technologies not be used to replace the classroom teacher, but to motivate students towards learning. Academic success, according to learning psychologists, depends on the degree of student motivation to learn a content area of study. This aspect of motivation becomes more compelling in science classes because many concepts of science cannot be directly shown or brought into the classroom on a daily basis. It was suggested that in science education, television's immediacy, pervasiveness, and ability to bring the world into the classroom could be effectively utilized by the teacher.

Scores on national assessments suggest the need to improve the quality of science instruction in American schools. According to the results from the 1986 NAEP Science Assessment (AAAS, 1989), there was no improvement in performance at the highest level (science proficiency scale) by any age group 9-17 year olds, compared to the 1982 assessment. In the first International Assessment of Educational Progress (1988), 13 year olds from the U.S. and five other countries were assessed in a standardized fashion in science. Average proficiency levels fell into three groups, which were significantly different from one another. Students in the U.S. were in the lowest scoring group, well below the mean, along with Irish students and two groups of Canadian students.

In 1986 the National Assessment of Educational Progress found the average performance of 17 year olds in mathematics and science remained substantially lower than it had been in 1969 (AAAS, 1989). As a nation, enrollments in college science programs had dropped steadily. The scores of American students ranked near the bottom of the list for industrialized nations. In volume 1 of The Condition of Education (Baker, 1989), comparisons of science aptitude for the years 1977, 1982 and 1986 at five proficiency levels for 9-17 year olds revealed that only 13 and 17 year olds in 1986 showed significant changes in understanding scientific principles and applying basic information compared with that of 1977, and of 1982 respectively.

Remaining competitive in science and technology is important for the United States. The results above reveal a need for remedies for the stalemate created in science proficiencies of American pupils from 1977 to the present. It becomes all the more urgent, in the context of these results, that appropriate motivating techniques be used in the classes of American high schools when delivering science lessons.

Theoretical Base

The relationships between motivational techniques and academic achievement have been addressed by educational psychologists from a variety of approaches. From a historical point of view, theories of motivation have existed as long as people have speculated about the reasons for their own behavior. Within the last 25 years, a growing understanding has developed that human behavior is complex and is determined by many factors (Weiner, 1969). No simple explanation, such as reinforcement theory, instinct, or need can comprehensively predict the diverse patterns of structured learning.

Educational psychology continues to be the foundation for most teachers in this country in the fundamentals of learning and motivation. A significant part of the problem of understanding student motivation is that psychologists, who do most of the writing and research on theories of motivation, often disagree in their basic assumptions concerning what motivation is and how influential it can be (Schultz, 1975). There is increasing evidence according to King-Stoops, and Meier (1978) and Lufler (1978), that classroom teachers themselves identify the teachers' failure to motivate as their number one problem in discipline and control. Teachers have also expressed the need to expand and vary their motivation techniques to accommodate the increasing diversity of the classroom population.

Walberg, Schiller, and Haertel (1979) analyzed reviews of educational research in the seventies, and reported that student motivation is one of six factors that can predict cognitive, affective, and behavioral learning outcome and gains with regularity. Walberg and Uguroglu (1980) concluded that students' motivation is a necessary condition for learning. They concluded that increasing factors such as quality and amount of instruction, at great cost, will be relatively fruitless if student motivation remains at a low level. They reasoned that one of the major problems facing teachers is to find a way to systematically consolidate motivational constructs across factors (rather than a homogeneous single measure of motivation) in a manner that identifies the causal relationship of these factors to classroom instruction.

Uguroglu and Walburg (1979) analyzed the correlation from a calibration sample of 22 students and a validation sample of 18 students. This provided evidence that motivation is consistently positively related to educational achievement. They also analyzed 232 correlations of motivation and academic learning reported in 40 cities with a combined sample size of 637,000 in grades one through 12. Ninety-eight percent of the correlations between motivation and academic achievement were positive; and the mean correlation across this sample was .34. These findings indicated that motivation had a consistent positive correlation with achievement.

There is no conclusive evidence to support the intuitive notion that motivation enhances learning, as explained in the Encyclopedia of Educational Research (1969). Part of the problem is that so many variables affect learning that it is difficult to isolate motivation and understand its true impact. Student motivation can be viewed as a function of ***expectancy of success*** and ***perceived value*** (Schunk, 1991). Instructors can directly maintain or increase student motivation by maximizing student expectations to succeed and increasing the perceived value which students assign to the course goals and objectives.

In a recent study (Nohen, & Haladyna, 1990) the beliefs of high school science students about the usefulness of various study strategies and their relationship to motivational orientations, perceived ability and attitude toward science were addressed. The results showed that such beliefs were more positively related to task orientations (one of the three categories of the motivation scale). Zeidner (1987) found that student motivation and attitude towards varying test formats (i.e. multiple-choice vs essay) could be assessed using a 10-item likert type scale with a five point continuum. Craig (1988) suggested that ability attributions for high school success have a positive effect on expectancy of success in college and on academic self concept. Effort attributions positively affect both academic self concept and predicted effort in college. This is consistent with Weiner's theory (1980) of expectancy--value approach to achievement motivation.

Since research in educational psychology has demonstrated that what teachers do is significantly related to student motivation, it is worthwhile to examine what technical means teachers can use to facilitate motivation (Wlodkowski, 1982). Television is one such technological incentive that influences elements of the affective domain such as interest, emotion or motivation. W. Gray (cited in Martin & Briggs, 1986), a psychiatrist, proposed that emotional nuances are the organizing structure for thought and knowledge, with cognitive structures having a much less important role to play. With regard to learning and education, Gray suggested that ignoring feelings may actually retard efficiency in learning.

The power of television to impact on student motivation, interest and attention is evidenced by the 1980 review of relevant research on the effects of the content of entertainment on television (Milavsky, Kessler, Stipp, & Rubens, 1982). One conclusion in the resulting report was that viewing by children of violence on television increased aggressive behavior. Although, this conclusion was challenged by the television networks, the convergence of evidence from many studies is overwhelming that television violence does lead to increased violence in children (Rubenstein, 1983).

Television can also be used to provide or supplement instruction within the school. Conclusions about the efficacy of instructional television have been mixed. This may be due, in part, to lack of availability of compatible equipments, statewide distribution systems, appropriate programs for specific curriculum areas, and consortium mode for production. Despite these handicaps, about one-third of the nation's students use instructional television on a regular basis (Rockman, 1985). Over the last twenty years, national regional agencies reviewed the availability of local materials, and the users of ITV identified various benefits, e.g., ITV increased motivation, illustrated difficult-to-teach concepts, and provided a common stimulus from which the teacher could teach.

Whether television programs have any impact in the affective domain on a learner has been studied from various standpoints. One major point studied in this regard is the instructional design of the program. Wakshlag (1982), Watts & Bentley (1987, 1988) ascribed the power of ITV to motivate learners to its design. Some typical responses of specific pupils were reported by the researchers. The best programs were entertaining, used contemporary media techniques and focused on social implications of science. Both teachers and pupils preferred the programs to be explanatory rather than simply descriptive. The teachers viewed educational television as an aid to teaching rather than learning. Youngsters valued the visual images and preferred the programs to be contextualized in the everyday experiences with which they were familiar. The use of background music at a certain tempo made a definite impact on the attention of the learners. It was found that irrespective of appeal, fast background music impeded information acquisition. The researchers concluded that if music was used intermittently and with high frequency or in combination with gratifiers such as humor, both attention and information acquisition would be facilitated.

A very comprehensive report based on over 50 formative research studies on the new PBS series 3-2-1 Contact was used for the development of the series to motivate children's interest in science and technology (Chen, 1980). The study generated many insights for program development in order to motivate students. Among them were strong storyline, active visuals, and the use of appropriate humor.

However, the above objectives of formative research tell us very little about the actual role the product can play in the ongoing environment of the classroom. Situated research serves a different purpose, that of effectively integrating technologies into teaching and learning. This type of research addresses questions concerning how the educational technology functions within the complex environment of the classroom (Hawkins & Honey, 1990).

The question of how well television teaches is likely to become increasingly important as the educational and tutorial role of the medium expands. O'Loughlin & White (1982), concluded from their research that the direct instructional model of ITV programs had a significant effect on children's learning. Direct instruction is a multi-faceted concept which includes a specification of desirable classroom management techniques as well as appropriate procedure for the effective presentation of information.

Several studies have been conducted to assess positive effects of TV on the attendance, scores, and attitudes of students. Studies (Wen, 1989; Ritchie & Newby, 1989) have shown that attendance was significantly higher in the language laboratory using TV as the supplementary medium. Also students using TV evaluated the instructor significantly higher than students not using such a medium. The test information indicated that there was significant increase in aural comprehension, reading comprehension and grammar abilities by the experimental group using TV as a supplementary medium. More importantly, those who had better attendance and attitudes also showed greater comparative improvement in their posttest scores. In the multiple group comparison, viz. traditional, studio, and distance learning, student attitude was more positive if the potential for interaction were present.

Whether television programs have the power to draw attention and arouse above or below average middle school boys and girls was investigated in a 1990 study. Results confirmed that an interaction between gender and ability differences in GSR (a measure of autonomic arousal) occurred for 5th and 6th graders while watching science educational television program.

Cognitive and motivational theory suggest that learner's schemata and attributions may influence their preconceptions of a medium (Weiner, 1979). Salomon (1984) arrived at the conclusion that previous social cues surrounding the viewing of television affect the Amount of Invested Mental Effort (AIME) in a negative way; that is people invest less effort in processing information from television and apparently learn less from it because it is perceived to be "easy". The characteristics of the medium can be manipulated easily in order to alter the learner's preconceptions of a mediated lesson and increase the mental effort that learners invest in processing the lesson. Cennamo et al. (1990) investigated learner's preconceptions of interactive video (IV), instructional television (ITV), and television (TV), and compared the three treatment groups on learner's perceptions of invested mental effort and achievement on a test of recall and inference. The results indicated that learners who were required to actively respond to practice questions that were embedded in a video based lesson recalled significantly more information than learners who were not provided with practice questions.

Methodology and Research Design

Against the above background of information on past research, measuring motivation through technological incentive like instructional television in high school science learning would be useful. This study investigated the motivational prowess of Instructional Television (ITV) used in a high school environmental science class. Instructional television (ITV) is characterized as closed-circuit video-taped or video-disc programs which are designed primarily to instruct rather than entertain. Educational television (ETV) programs have the dual purposes of instruction and entertainment.

Subjects

The sample for this study was tenth grade students of a suburban school near Cincinnati. The school had an enrollment of 1,987 students in grades 9 through 12. There were 110 teachers teaching at various levels. The school owned 2 to 5 VCR units and 67 units of microcomputers, namely, Apple, IBM, and Macintosh, 16mm films, and 500 video tapes. The student body was made up of 1% Asian, 4% Black and 95% white students. For the school district, in an average daily membership of 10,236 students, the majority are white students forming 89.7% of the population. The next are black students making 8.8% of the population, followed by Asian/Oriental 1.0%, and Hispanic 0.3%.

Research Design

Students in two tenth grade sections were enrolled in environmental science. The two sections enrolled a total of 57 students. Research data were collected during the teaching of two text book units: Soil and Energy Resources. The two sections were used alternately as the control and the experimental group for the two units. When serving as the control group, the class received the live teacher instruction alone. When serving as the experimental group, the class received televised instruction as a supplement to live teacher instruction. At the end of each unit the teacher gave the usual unit test. During the unit, students in the experimental group were shown appropriate video tapes at two different points. The purpose of the tapes was to improve student motivation toward the topic. The five tapes used were: Soil from the beginning (11 mins.), Common ground:Farming and wildlife (60 mins), Energy in perspective (21 mins), Nuclear energy (10 mins), and Future energy resources (15 mins). These were selected by the teacher from the school media library, and subsequently previewed by him for use in the classroom.

A quasi-experimental, intact group, crossover design was employed. The researcher observed the classes on six days during the teaching of the units. For each unit, the classes were observed for three days. Two of these days, included the two televised instruction days and one traditional teaching day for the experimental group. The student engagement rate was measured by the researcher on each day of observation. The class time available was 50 minutes. Every 5 minutes students were observed in order to judge whether they were engaged in learning, uninvolved, socializing, or waiting for the time to pass. The students were thus observed 10 times. Across these 10 observations, if a student was uninvolved 0-2 times, the involvement was regarded as "high", if uninvolved 3-5 times, the involvement was regarded as "moderate", and if so between 6-10 times, then it was regarded as "low" involvement. These data are shown and analyzed in the section on student involvement.

The unit tests on the Soil and Energy Resources were given by the teacher at the completion of each unit. The instrument for measuring motivation (will be available upon request) prepared by the researcher used two dimensions: expectancy of success and perceived value. This instrument was given to the students after they had completed both units. The reliabilities of the instrument for measuring motivation are reported in Table I.

The motivation instrument used a "semantic differential" to measure the beliefs that the respondent holds about each topic. Alpha reliability is the measure of internal consistency. The source of this instrument is Osgood's evaluation factors. The motivation tests given on the soil unit and the energy unit were judged to have face validity and construct validity based upon previous work by Osgood (1957).

Results

Summary of qualitative observations

The researcher found that the students of the two classes were similar in their behavior, attention span, interest, and seriousness in learning. It appeared that the same students maintained a more serious attitude toward studies while others were casual. Some boys seemed to be more interested in learning than the girls. The students who socialized during class, did so for all classes irrespective of the topic or the activities. At least two students out of 25, in each class, slept throughout the period on all days of observation. On the whole, the involvement of the students shown toward their studies was at a low level. A couple of students engaged in other activities during the period on two occasions. The teacher had a friendly attitude toward the students in general, but warned the students found sleeping in class/or being inattentive, three times during the six days. The use of the televised program on the soil unit for the entire duration of the period on the third day of observation was not expected by the researcher. It was expected that televised instruction was to supplement live teacher instruction. The above mode of using the videotape altered the nature of the treatment originally proposed, as that of teacher-media partnership. The teacher did not quite attempt to integrate the information of the televised program with the body of his lesson in a consistent manner. As a result the purpose of showing the programs was somewhat lost, as the teacher's message and that of the television remained isolated for the most part.

Data Analysis

Table I
Test Reliability Estimates

Test of Motivation	Alpha coefficient
Energy Total	**.76**
Energy	.61
Energy Value	.74
Soil Total	**.73**
Soil Understanding	.63
Soil Value	.77

Equivalence of samples. The study was designed to test whether televised instruction made any difference in the measures of motivation of the students of environmental science class. Since subjects were in intact groups it was necessary to ensure whether the control and experimental groups were equivalent. Table II describes the performance of subject populations on the Student Ability Index (SAI) and science grade point average (GPA) for the last quarter.

These results show that the groups did not differ on either the SAI or the science GPA for the last quarter, since the difference in the means was not statistically significant.

A MANOVA was done to test whether the groups were different on SAI and science GPA simultaneously. The significance of F being .916, there was no difference between the groups on SAI and science GPA.

Finally, according to the teacher's estimate, the two groups were equivalent on their level of aptitude and performance. Based upon these observations, the control and experimental groups were deemed equivalent.

Treatment Effect. The study was done to examine whether the treatment had an effect on the students' achievement and motivation (See Table III). For the soil unit, students in section 1 were the experimental group and for the energy unit, students in section 2 were the experimental group.

Table II
SAI and Science Grade Point Average of Subject Populations

	Section	Mean	SD	N
SAI				
	1	108.7	8.75	19
	2	107.5	10.94	24
Science GPA	(4 point scale)			
	1	2.34	1.01	29
	2	2.14	1.18	28

Table III
Descriptive Analysis of Treatment Effect

	Treatment			Control		
Soil	**X**	**SD**	**N**	**X**	**SD**	**N**
Motivation	4.57	2.73	28	4.49	2.4	24
Understanding	-1.1	3.08	28	-1.2	2.7	24
Value	-1.4	4.05	28	-.70	4.18	24
Achievement	50.4	9.8	28	48.8	12.7	28
	Control			**Treatment**		
Energy	**X**	**SD**	**N**	**X**	**SD**	**N**
Motivation	5.71	2.96	28	6.90	2.38	23
Understanding	-2.1	3.03	28	-2.3	3.72	24
Value	-3.3	4.19	28	-4.1	4.34	23
Achievement	48.9	7.66	29	50.3	12.9	24

A MANCOVA (Wilks test) was done to test for differences between the groups on soil understanding, soil value, and soil achievement when science GPA was used as a covariate. The significance of F .000 shows that the covariate "science GPA" was related with at least one of the three dependent variables:
soil understanding, soil value, and soil achievement. The results of the univariate tests are shown in Table IV.

The univariate test revealed that each of the three variables was related to previous science grade. A MANCOVA (Wilks test) obtained a significance of F .000, which shows that the covariate "science GPA" was related with at least one of the three dependent variables: energy understanding, energy value, and energy achievement. The results of the univariate tests are shown in Table V.

The univariate results showed that only energy understanding was related to previous science grade.

A MANOVA (Wilks test) on energy motivation and achievement with science GPA as the covariate yielded the significance of F 0.132 suggests there was no significant difference between the two groups on energy motivation and energy achievement.

A MANOVA (Wilks test) on soil motivation and achievement with science GPA as the covariate yielded the

Table IV
Univariate Test

Variable	Sq	Mul. R	Adj	Hyp	Error	F	Sig of
Soil Understanding	.16250	.40312	.1450	68.3	7.33	9.31	.004
Soil Value	.07748	.27835	.0582	64.4	15.9	4.03	.050
Soil Achievement	.33171	.57594	.3177	22.20	93.2	23.8	.000

Table V
Univariate Test

Variable	Sq	Mul R	Adj	Hyp	Erro	F	Sig
Energy Understand.	.43281	.65788	.42048	21.3	60.77	35.1	.000
Energy Value	.03782	.19448	.01691	32.2	17.82	1.80	.185
Energy Achievement	.04211	.20520	.02128	21.5	10.64	2.02	.162

significance F 0.998 suggests that there was no significant difference between the groups on soil motivation and soil achievement.

Student engagement. The involvement of the students in the two groups was rated by the researcher as described in the methodology section and was analyzed by chi-square method. The null hypothesis was that the groups would be equivalent on involvement rate for the two units. Tables VI and VII show the involvement level of students for the two units of soil and energy resources, respectively.

Table VI
Student Engagement Rate: Soil Unit

Day	Involvement	Control	Experimental
1	High	11	6
	Moderate	0	6
	Low	12	13
2	High	5	16
	Moderate	15	7
	Low	5	4
3	High	11	16
	Moderate	8	5
	Low	8	5

The chi-square value was 2.530 with 2 degrees of freedom, which was less than the critical value of 5.99 at .05 level. Hence we fail to reject the null hypothesis and we report that the groups were same on involvement for the soil unit.

Table VII
Student Engagement Rate: Energy Unit

Day	Involvement	Control	Experimental
4	High	17	17
	Moderate	4	2
	Low	2	7
5	High	15	11
	Moderate	4	5
	Low	8	4
6	High	14	15
	Moderate	4	4
	Low	8	9

The chi-square value was .151 with 2 degrees of freedom, which was less than the critical value of 5.99 at .05 level. The null hypothesis was not rejected. Hence the groups are same on involvement for the Energy Unit.

On the basis of the above information the involvement of the students across units was analyzed using the chi square method. The results are reported in Table VIII.

The chi-square value on the above table was 10.206, which is greater than the critical value of 5.99. Hence the students' involvement was significantly different for the two units of soil and energy. Involvement was higher for the energy resources unit. Fifty-nine percent of the students exhibited high involvement levels during the energy unit as opposed to 42.4% during the soil unit.

Table VIII
Student Involvement Across Units

Involvement	Energy	Soil	Total
High	89	65	154
Moderate	23	41	64
Low	38	47	85

Conclusions and Discussion

The results of the study suggest that televised instruction used as a support to live teacher instruction did not produce significant differences in the learner's understanding, the perceived value of the units, achievement test scores, or motivation. The study had several limitations. The first was that the content and use of the videotapes might not have been appropriate to motivate students. The second tape on soil dwelled on food production and agriculture and did not relate directly to the contents of the unit. The use of the televised program for the duration of the period was not deemed appropriate by the researcher since there was no follow up discussion or activity. The main defect in the presentation of the tapes was that the content of the tapes was not referred to by the teacher at the end of the viewing. As a result, the televised program stood in isolation and the students did not have the opportunity to discuss what they viewed.

Television has the potential to present science in a certain context, enabling learners to become immersed in the culture of an academic domain. Situated cognition takes place in learners at their individual levels through perceptual learning. Since perception is both fact as well as non-fact, teachers need to "tune the attention" of students to those aspects of the situation that will afford the acquisition of the intended knowledge. Next, teachers must provide "scaffolding" for novices which will initially limit their access to all the complexities of the context but later be removed as students upgrade to expert performance (Young, 1993). In this study, the teacher did not provide such guidance.

Since this is a situated research, it may serve to guide future researchers in utilizing the potential of television in motivating students for learning science.

This researcher believes the results of this study could be improved by:

1. Selecting better televised programs that would relate more closely with the content.
2. Integrating the televised instruction with the lesson flow so as to allow the students to see the connection.
3. Extending the research over a longer period of time, say over two months.

Good quality visuals on the television monitor supported by a clear commentary may have the potential to encourage students to appreciate the nature of science and leave a permanent impression on the mind. Exploiting the potential of television may add a new dimension to our instructional process. Motivating students to learn is a constant challenge for every teacher and televised instruction could make our effort a lot more easier if the above suggestions could be implemented.

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Exploring Context in the Viewing of Local TV News

Charles Lewis

Introduction

According to reception theorists, communication always occurs within particular institutional, historical and cultural contexts. Thus, meanings generated through communication do not simply exist in "words on a page or dots on a television screen, but come ... about as a result of a confrontation between viewer and image" (Allen, 1987: 5). This pilot study addresses some of the contextual elements that are a part of communication.

In the contextualist framework, the *process* of generating meanings and the *context* in which this happens should be central to communication research (Carey, 1989: 18). Such an approach is theoretically supported by much scholarship. In general, this includes research and theory concerning the formation of a sense of self through interactions in particular contexts, espoused through the years by such scholars as Goffman (1959, 1979). Specifically, such an approach is supported by Bandura's (1977) social learning theory, which postulates a family member is the product of the reciprocal interaction of self, behavior and environment.

This pilot study, based on observations and interviews conducted in 1989 when the author was a doctoral student, focuses on how a married couple with a small child integrate the 10 p.m. television news program into their weekday lives. This research focuses on how patterns of behaviors *extend into* television viewing, rather than how TV programming influences beliefs, values and behaviors.

No doubt television is a powerful force in American life. More than 98 percent of American households have at least one television set, with most families have two or more sets. A majority of American homes now have cable and a VCR, and a television set is on in the average American household more than seven hours each day (Television Bureau of Advertising, Inc., and A. C. Nielson, reprinted in DeFleur and Dennis, 1991: 209-211, 218).

In following Glaser and Strauss's (1967) strategies for generating theory in qualitative research, the hypothesis here is that television can be strongly linked to significant social processes within the home. This micro study is not intended to prove the prevalence of certain interactions or other behaviors as they relate to TV. The ethnographic data and analysis presented here are meant to provide the basis for more theory and research in understanding television in home life.

This study adds to emerging critical, qualitative audience research and theorizing, which explore issues of ideology and hegemony (See Lindlof, 1988;

Jensen, 1987; Wren-Lewis, 1983; Liebes and Katz, 1990; Morley, 1986; and Ang, 1985). It also adds to pluralist studies, which usually do not address issues of societal power relations like critical studies, but instead explore interpersonal patterns of behavior in relation to media use (See Lemish, 1985, 1982; Wolf, Meyer and White, 1982; Lull, 1980a, 1980b, 1982a, 1982b; Bryce, 1980; Davis and Abelman, 1983; Brody and Stoneman, 1983; Bryce and Leichter, 1983; and Goodman, 1983).

Method

This micro study employs ethnographic methods. A young, suburban couple who have a small child were observed and interviewed. The author first met the couple in 1980 during undergraduate school. Since then the author and couple did not remain in close touch, but were still friends. In 1989 as part of a doctoral study project, the author spent two evenings observing the couple: Tuesday, Feb. 7, from 9 to 11 p.m., and Thursday, Feb. 9, from 9 to 11 p.m. On Saturday, Feb. 11, the author interviewed the couple. This paper begins with background material concerning the family and their television viewing behaviors. Next observations are detailed, followed by an analysis of the observations and the results of the interview.

Description and Analysis

Jay and Glenda Smith, their 2-year-old son, Alex, and their terrier, Mickey, live in a pleasant Brown rambler situated in a northern suburb of middle-class affluence in the Minneapolis/St. Paul metro area of Minnesota. (Pseudonyms are used for all family members.)

Although the Smiths do not have one, the swimming pools of several neighbors can be seen from Jay and Glenda's rear patio sliding door. Theirs is a quiet neighborhood of responsible, middle-class, predominantly white, working, urban Minnesotans — a good place, according to the Smiths, to raise their child. Jay and Glenda each appear to be relatively happy, fulfilled, bright and healthy individuals. Glenda enjoys conversation and is willing to speak her mind on most topics. Jay is generally more reserved than Glenda. He is often quiet, but he appears to be paying close attention to any conversation taking place.

Both Jay and Glenda were reared on farms near small communities averaging 5,000 inhabitants. They met while attending college and were married in 1982. Both hold bachelor's degrees — Jay majored in psychology and mass communication; Glenda majored in elementary education. Jay, 30, is a senior social worker for a government agency. Glenda, 29, manages the customer service department of a retail business; she has eight employees working under her management. Each has a 20-minute drive to work each day. Both say they enjoy their work despite the near-frantic pace of their daily lives created largely by job responsibilities.

Jay and Glenda rise at 6 a.m. each weekday in order to prepare themselves for work and, of more importance, to prepare their 2-year-old boy for the day. Alex is cleaned, dressed, fed and taken to a day care operation only a few blocks away from their home, where, according to Glenda, he "watches way too much television." Glenda, who picks up Alex on her way home from work, usually arrives home between 5 and 5:30 p.m. Jay arrives soon after Glenda and Alex.

According to Glenda, it is at this point the family's television is turned on: "Jay controls the TV set — I don't touch things. ... If I turn the set off in the evening, Jay will say, 'what did you do that for?'" Jay did not deny this. He said he usually controls the television with a remote — if he can find the remote, which often disappears for lengthy periods thanks to Alex or the dog, Mickey.

The Smiths have only one television set, a color set about 10 years old connected to the local cable service. It, on a stand along with a VCR, anchors a corner of the living room. Their living room is carpeted and contains comfortable, fairly new furniture. Most of the sitting spaces in the room face the television set and picture window, apparently the two most visually stimulating points of the room for the family.

The Smiths both agreed they spend most of their leisure hours in the living room. They said the television is almost always turned on when they are in this room, although they may be involved in activities other than viewing the set, such as playing with Alex. The Smiths do have a den, but said they spend little time there.

The second most-occupied space of the house for family activities is the kitchen/dining-room area. Meals are eaten in the dining room, and the television is turned off during meals. Before Alex was born, Jay and Glenda used to eat meals in front of the television frequently. "Since Alex we try really hard to make quality family time at the table," Glenda said. Alex becomes too distracted when the television is on — he will leave the dining-room table for the living room and the television if he hears programs or commercials with which he is familiar.

So, the set is off during meals. Interestingly, Jay and Glenda agreed that if they had another television, it would be placed on the kitchen counter where it could be seen from the dining room. They say this second set would probably be turned on during meals. Neither appeared concerned that this might affect "quality family time at the table." But perhaps this is a reason they do not purchase another television — they know they would put it in a place where it would negatively affect the family communion during meals.

It is interesting they think they could not control their viewing behavior for the sake of "quality family time." Like the narcotic addict, if the drug is available, it is very difficult to avoid ingesting it. Television is apparently an important component of the Smiths' home life. They recognize this and do not appreciate the powerful role of television in their lives.

Jay and Glenda agreed they have the television set turned on at least three to four hours each evening during the work week. They said on weekends the set is usually only turned on for sporting events. While discussing this during the interview, Glenda exclaimed: "This is embarrassing — it's terrible when you start thinking about what you do. God, we watch too much TV." Jay and Glenda enjoy much of the new entertainment programming that targets the baby-boomer generation: Shows such as *thirtysomething, The Wonder Years, Almost Grown* and *Roseanne* are among Jay's favorites; Glenda enjoys the same shows as Jay except for *The Wonder Years,* which she does not appreciate because of one episode that depicted children drinking and smoking.

They both enjoy broadcasts of sporting events, especially baseball. Jay watches public television quite often with Alex, who likes to watch nature programs. According to Glenda, Alex enjoys network/cable commercial advertisements more than anything — he sings along with the soundtracks of several commercials.

Jay and Glenda agreed that their pattern of weeknight television use varies little. As stated earlier, Jay turns on the television after arriving home from work around 5:30 p.m. Neither Jay nor Glenda spend much time watching the television from this point until they shut it off during supper. Instead, they listen to it while preparing supper. They say that during this pre-supper period the set is always tuned to local and national news broadcasts — never to reruns or other entertainment programming. Next comes supper with the set usually turned off.

After supper, while the dishes are washed, Jay turns the set back on. Again, they listen to it from the kitchen and dining room rather than watch it. Alex, however, is probably at this point in the living room watching the set. They say it is about 7:30

p.m. before chores are completed and all family members are in the living room. For the next hour the three of them watch television and/or interact through use of games, puzzles, horseplay, etc. The television usually remains on no matter what the form of interaction.

At 8:30 Glenda puts Alex to bed. Jay and Glenda agreed their nightly "alone time" is from 9 p.m. to about 10:30 p.m., and it is usually spent in the living room. During this period the television is on. They said they almost always watch a local television news broadcast before going to bed.

It was during this late-evening period of "alone time" that Jay and Glenda's television viewing behavior was observed. The author arrived for the Tuesday observation session just before 9 p.m. Both seemed to adjust to the author's presence in a matter of minutes. Both were dressed in sweatsuits. Jay promptly settled into the chair nearest the television set while Glenda wrapped herself in a blanket and sat on the couch with her feet up on the coffee table.

From 9 to 10 p.m. the couple and author chatted while *thirtysomething* was on the television. While Glenda appeared more interested in conversing, it was obvious Jay would rather be watching the show, which, according to Glenda, is one of his favorites. He was trying to follow the show and engage in conversation. Towards the end of *thirtysomething*, the author disengaged from much conversation and simply observed. By 10 p.m. it appeared they felt quite comfortable with having an observer in their living room.

After *thirtysomething* the usual teaser came on for the KSTP-TV (Channel 5) news, which is the ABC affiliate in the Twin Cities. Jay switched the channel to KARE-TV (Channel 11), the NBC affiliate, saying he didn't like the lead story advertised on KSTP's teaser — it was about the "comeback of big cars," which Jay considered a "silly" lead story. He also told Glenda that he wanted to watch Channel 11 because he saw a KARE news crew that day in the government center where he works.

He said there were police stationed on every floor of the center that day, and he didn't know why but had heard a rumor that the police had lost a prisoner in the building. The KARE introductory graphics and sound began with neither Jay nor Glenda paying much attention. Jay was playing with the dog while Glenda was adjusting the blanket around herself. When the lead story (about a local bank scandal) began, Jay's attention turned from the dog to the television. He watched rather intently, looking like an attentive student in a college lecture hall. Glenda also began watching, but appeared more relaxed than Jay.

Towards the end of the first story Glenda got off the couch and went to the bathroom, saying she needed to brush her teeth. The second story was about jury deliberation in the trial of a man accused of murdering a woman. Jay continued to be glued to the television and began to make noises such as "hmmmm," indicating he found the story interesting. Glenda came to the hallway entrance, toothbrush in mouth, and watched intently. Jay soon began commenting on the story — addressing his comments to no one in particular — he appeared to be talking to the television. When a video clip of the prosecuting attorney was presented, Jay said: "He doesn't look like a prosecuting attorney; he looks like one of the transient witnesses!"

Meanwhile, Glenda finished brushing her teeth and was back on the couch under the blanket before the murder trial story ended. The couple missed the third story presented because they began a discussion based on the second story. Part of the story dealt with the murdered women's children and what had become of them. Glenda caustically commented that the children were probably better off since their mothers were often in bars picking up strangers (implying they were not good mothers). Jay said he thought she was being judgmental and heartless.

The next story they paid attention to concerned the rejection of a congressional pay hike. This also led to a debate/discussion between the two. Jay thought they deserved the pay hike while Glenda did not. The author intervened at this point and asked if they were involving themselves in these discussions somehow because of his presence. Both immediately said they were not — they said they enjoyed these playful arguments over issues, and that this was a very common occurrence for them while watching the 10 p.m. news. It was as if the news were the moderator of discussions that helps them "connect" after a day of physical and mental separation from one another.

Neither appeared to pay much attention to any of the commercials between any of the segments. They usually used the segments of commercials as intermission periods. Jay brushed his teeth during the first commercial segment. Glenda let the dog out during the second commercial segment and back in during the third. During the interview they said that although they do not appreciate commercials, they do appreciate the intermissions made possible by commercial breaks.

Glenda considers commercials "a rude interruption" and resents the apparent hold they have on Alex, who is fascinated by them. During the broadcast Jay commented on commercials only once. He noted how so many advertisements were about farm products; he figured market research must show a lot of farmers watch the show.

Interest in the broadcast was most keen during the weather. Both paid close attention to the forecast. Jay tended to laugh out loud during the banter accompanying the weather; Glenda smiled. It appears Jay is the family's "opinion leader." Glenda is by no means subservient to Jay — she certainly speaks her mind and is obviously a dynamic individual, but Jay appears to have the most authority in the family.

For example, he usually controlled the television through use of the remote. His role as opinion leader was also indicated as conversation was again prompted by the broadcast when the KARE meteorologist mentioned the temperatures in Minnesota's Red River Valley communities. Glenda asked Jay if that would be a good place to vacation next summer. Jay replied that it would not — that it was "nothing but boring farmland."

After the weather, attention to the broadcast lagged significantly. Glenda appeared to be falling asleep on the couch. Jay had his chin cupped in his hand. They conversed about packing lunches for work. As a whole, the news show appeared to be signifying to them that another workday would soon begin and preparations must be made. At this point — right before the sports segment — Jay said he would turn the television off and go to bed because there "are no good sports this time of year."

Before leaving, the author asked if, other than not turning the set off after the weather, they would have behaved differently if alone. Glenda said they might "have been more affectionate," such as sitting by one another on the couch. Other than that they both agreed it was a "normal" evening.

Thursday night was chosen for a second observation because programming would be affected by President's Bush's speech concerning the national budget. Because of the speech, the 10 p.m. local news shows began about 20 minutes late. The author wanted to see how this disruption in the normal pattern would affect viewing behaviors, and arrived at about 9 p.m. when Bush's speech was nearing the end. Jay and Glenda were watching the speech on KSTP.

A conversation about the recent presidential election ensued so that the couple missed the end of the speech and the following network news analysis. Following the speech the program *Dynasty* was presented, out of its usual 8 p.m. slot. It began about 9:20. Glenda was delighted to see the show, which she usually misses because they watch a show on another station at 8 p.m. Thursday. Jay made it clear he did not care for *Dynasty*.

What resulted was just the opposite of Tuesday's experience. This time Jay conversed with me while Glenda had a difficult time trying to divide her attention between the show and the conversation. They were both seated on the couch, dressed in the same sweatsuits, and Glenda was again wrapped in the blanket with her feet on the table.

This time they did not switch to KARE for the news show, although the remote was near Jay. KSTP's news show did not begin until nearly 10:30. During the introduction Glenda commented on how the meteorologist looked "like a little boy." This began a discussion between Jay and Glenda in which they analyzed the presentations of the weather by the various "weather personalities" on the four local stations' news shows. Because of this, they missed most of the lead story.

Soon after the discussion, during the second story, Glenda got up and went to brush her teeth. A few minutes later she appeared at the hallway entrance and said she was going to bed, which she then did. Jay continued to watch the news and commented to me how he thought KSTP's news was "sensational" and "too dramatic" after viewing a segment in which a 911 phone call was replayed as part of the narrative of a hard-news story.

During the commercial breaks, Jay brushed his teeth and let the dog out and back in. At about 10:40, after the weather was presented, Jay shut the television off with the remote and said it was time for bed. Jay explained that during the baseball and football seasons he always watched through the sports reporting, but rarely to the very end of a broadcast, unless it was about something of particular interest to him. He said Glenda often went to bed right after the weather forecast.

It was interesting Jay stuck to his habitual pattern of viewing despite the late hour, but Glenda was more aware of "real time," not "broadcast time." She went to bed at her normal time even though the news was only beginning.

Jay did not go to bed although he appeared quite tired. Perhaps this loosely indicates the level of control the television has over Jay's home life — the television dictates activity. They both agreed in the interview that Jay enjoys and watches more television than Glenda, whether news or entertainment programming, which could be why Jay generally controls television viewing.

From these observations and Saturday's interview, several conclusions concerning the relationship between the 10 p.m. television news and Jay and Glenda Smith were arrived at. First of all, they do not watch television news programs in order to become better informed about events, although being informed is sometimes a sketchy byproduct of watching — Jay said they sometimes get "headlines" of breaking news events from television. The only information they feel they truly need from the broadcast is the weather forecast. Glenda said she needs to know whether she should "plug the car in or not," etc.

Both, however, are concerned about being adequately informed about current events. Jay said he wants to know "the news" because "otherwise we'd be living in a vacuum and not know what's going on." Jay mentioned how he still values his journalism training in an undergraduate university mass communication program even though he has not used it professionally. He implied he would feel guilty if he were not a consumer of news.

Glenda brought up two interesting points concerning why one should be informed about news: She considers news an aid in helping people form values and opinions. "I think news helps you develop what you stand for," she said. She also said news "helps me socially ... it helps me get through the day." She went on to explain how she uses a knowledge of current affairs as a basis for socializing at work because "news is often a topic of conversation at work."

The Smiths subscribe to two newspapers, the daily Minneapolis *StarTribune* and a weekly suburban. They claim to thoroughly read the *StarTribune* every morning before work. Both agree they get most of their working knowledge of the day's "news" from the newspaper, not television. When asked which medium they would believe if a television news show and a newspaper presented different accounts of the same event, they both immediately said they would believe the newspaper because newspaper news is presented "in more depth" and "they (newspaper personnel) have more time to check the facts."

When asked whether they thought local television news informed them well, they both emphatically replied that it did not, saying TV news is "sensational" and "overly dramatic." They also make a strong inferential interpretation of the purpose of television news shows. When asked what they thought the purpose of television news was, they replied:

Glenda: "Prestige."
Jay: "Ratings."
Glenda: "They're doing it for their own personal benefit. They're doing it for their benefit, not our benefit — for profit."
Jay: "For the advertising dollar. Their top priority is not to give us quality newscasts; it's to get people to watch them."

So, although they apparently do not see much quality in television news and suspect that the corporate authors of the news shows are simply interested in profit, they still listen to the news while fixing supper and watch the 10 p.m. news before going to bed. Television news is a part of their lives, but their reasons for consuming it obviously have relatively little to do with "getting the news." For them, the 10 p.m. news first of all provides a context for them to connect with one another — to talk, to be aware of one another. Their behavior during the news shows reinforces this conclusion.

They appear to use the presentations of news as a stimulus for discussions in which they outline to one another their knowledge and opinions concerning the subject at hand — knowledge they claim to build through reading the "in-depth" newspaper. They often engage in this activity of "playful argumentation" while seated close to one another. In short, television news at 10 p.m. helps provide a context for intimacy.

In addition, viewing the 10 p.m. news appears to be an evening ritual for them that signifies the end of the workday. Again, this has nothing to do with becoming informed. They said in the interview they rarely watch the 10 p.m. news on the weekends. In fact, they do not normally watch any news on the weekend, but they rarely miss the news on weekdays. To them, the 10 p.m. report is analogous to a period at the end of a sentence — the sentence being the workday. Glenda put it best: "It (the 10 p.m. news) is an *alarm* — it's an alarm to go to bed. If I don't go to bed after the news, boy, I'm never going to be able to get up in the morning."

The news shows at 10 p.m. during weeknights, then, seem to signify the end of their short "unwinding period" from 9 to 10:30 p.m. The news show is the last stage of their weeknight pattern of relaxation — it provides a context for playful interaction between the two; it ultimately is the "alarm" to go to bed. It also serves another purpose as part of their pattern of relaxation — it is entertaining for them and often simply makes them feel better about life in general.

The news show, like the entertainment programming presented before it, offers a video escape from reality (which is ironic, considering the news is supposed to be depicting reality). For example, Jay, the former mass communication major, said he would watch a public television local news show if one were offered at 10 p.m. Glenda immediately responded to his statement with: "Well, I wouldn't watch it (a PBS local news show) — I wouldn't find it entertaining enough."

Although Jay professed a desire for what he would consider more quality-oriented local television news, his viewing behavior and several comments during the interview suggested he feels much the same as Glenda concerning the 10 p.m. news — he would miss the entertainment inherent in it. He is most interested in two presentations in the newscasts: weather and sports. The weather forecast truly is giving him vital information.

Sports, however, is a different "story," so to speak. Sports news — during the baseball and football seasons especially — is simply a continuation of coverage of the sporting events he probably watched on television or saw live. Viewing sporting events is an important form of entertainment for him. Like many, Jay wades through the "news" in the program in order to get one last bit of entertainment from the sports segment of the news show.

More indications of the "entertainment/feel good" factors emerged during the interview. When asked which news show they watched most and why, their answers differed significantly. Jay said they watched KARE most often; Glenda said KSTP. They agreed they rarely watch KMSP-TV (an independent) or WCCO-TV (the CBS affiliate). Glenda said WCCO news is "quite boring" since a particular female anchor left. Glenda equated personalities with an interesting show, a theme they then discussed at length.

In fact, they had little to say concerning story structures, use of video clips, graphics, or reporting skills, although they were asked about each. But they did have many comments concerning the personalities, who *were* the shows as far as they were concerned. For example, both said they like KARE much better than KSTP, although they watch KSTP quite frequently. Glenda and Jay both expressed a deep disgust with KSTP news at 10 p.m. entirely based on personalities:

Glenda: "Like that Randall Carlisle (a male anchor) — he seems like the biggest dupe from nowhereland. And, you know, Stan Turner (a former male anchor) was a nice guy — I liked him. I don't like how they treat their people there (KSTP). I used to like Cyndy Brucato (a former female anchor), and they just ditched her. I don't like how they treat their people so I don't like their newscast."

Jay: "And that Mark Curtis on Channel 5 sports — they bring this guy in from Phoenix right before the World Series (1987 Series) and he's terrible. The guy's here for a week and all of the sudden he is the world's biggest Twins fan and knows all there is about the team."

Glenda was upset that the corporate owners could be so callous when dealing with anchors. She spoke as if Cyndy Brucato and Stan Turner were old friends she knew well. Jay was upset that Mark Curtis, who was obviously *not a member of the community,* could be so pretentious when it came to the Minnesota Twins. Glenda implied a similar disruption of the sense of community in her comment about Carlisle — the "dupe from nowhereland."

Still, they both agreed they watch KSTP quite often. Why? Glenda said it is the most entertaining because it has the most sensational and dramatic story presentations. It's "showy," according to Glenda. Jay said they enjoy criticizing the show and its anchors. Jay said it is similar to when "you watch a grade B movie just to get a laugh — just to see how poorly it is done. We like to rip Channel 5 apart." Thus, the show is not only entertaining for them, but provides them with a forum for interacting.

They both most appreciate KARE news at 10 p.m. for two reasons: First, personalities again. Glenda considers the personalities on KARE news to be "a little more relaxed — more the kind of people I could invite into my home and feel comfortable with." Their second reason concerned the type of stories presented and the style of presentation. Jay says he goes to bed "feeling a little better after watching Channel 11." He considers KARE to have "a little less blood-and-guts stories" than the other news shows, and KARE "will more often give you a little candy-coated sweet story about something." Glenda added that she is drawn to KARE because they have many stories that are about "how government or religion hurt somebody — hurt the common person." She said she can "relate to that because it shows how justice has been served in some way."

Conclusion

"Getting the news" apparently is not an important reason for Jay and Glenda to watch local television news each weeknight. Viewing the 10 p.m. news is a ritualistic activity for them that signifies the end of the workday — an "alarm to go to bed." Certain activities always take place at that point in the evening — teeth are brushed, the dog is let out and in, the news is watched. The news helps them interact — to redevelop a closeness dissipated by a busy day by providing a context for conversation. The news is simply entertaining for them — part of their nightly pattern of relaxation.

The news shows' presentations and their personalities reinforce a sense of belonging to the community for Jay and Glenda, so much so that they resent "intruders" in shows (and thus their community) such as Randall Carlisle and Mark Curtis. And the news simply makes them feel better about the day and their lives. They know KARE is "candy-coated" but it doesn't matter because it makes them feel good. They know they can "get the news" from the newspaper.

Like the work of Lull (1980a, 1982a), Wolf, Meyer and White (1982), Morley (1986), Palmer (1986) and Press (1989), this study indicates television is more than a transmitter of entertainment and information because TV is more than its messages. The medium and its technology serve as one focal point for family rituals. This study indicates that the complexities that make up family behaviors are affected by the use of the television. Thus, for those families who regularly use television, it is likely the medium is an integral part of the complex, day-to-day construction and negotiation of meanings.

It is fair to conclude television is such a part of this couple's existence that it has become a natural part of their world. Television and its viewing are taken for granted by the Smiths. The TV is something to use as a tool in enhancing interpersonal roles and relations. Therefore, television is not something that is outside of people's lives — the TV is inside the family, so to speak. This could reinforce television's role as a dispenser of sanctioned views of reality.

The "preferred meanings" (Hall, 1980) of a television program — those that display ideologies that benefit the dominant in society — are more likely to be unquestionably accepted by viewers if the medium is seen as a natural part of family life. In short, an "attributional" understanding of television messages is reinforced (Messaris and Gross, 1977).

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Examining the Impact of the Channel One School Newscasts

Evonne H. Whitmore

Educators began evaluating the possible impact of the Channel One news program even before it hit the airwaves more than four years ago. Few "so called" educational programs have dichotomized educators like the twelve minute daily newscast. However, despite its highly controversial status, Channel One's phenomenal growth has taken the nation's public schools by storm. There are now over 12,000 secondary schools nationwide which subscribe to the broadcasts (Johnson & Brzezinski, 1992).

The venture which is part of the program offering from the Whittle Communication Corporation is the largest school television project in the history of American education. Why have so many public schools signed? Some would suggest that the Whittle Corporation has made schools an offer they can't refuse. Whittle provides Channel One free of charge, along with other programs on its Classroom Channel and Education Channel to school systems which can guarantee at least 400 viewers. The package also includes a cabling setup, a 19-inch color television set for every classroom of 23 students, two video cassette recorders and a satellite dish to download the programs. The equipment becomes school property after 3 years (Whittle Communications, 1990, 1992). If all of this sounds too good to be true, it is. There is, of course, a "catch." There are two minutes of commercials sandwiched in the middle of each newscast. Many parents and educators question the appropriateness of allowing advertisements in the classroom, where students are a guaranteed captive audience (Rist, 1991).

The Research Issues and Questions

Many of the complaints about Channel One concern issues of "style over substance." The show is presented in a fast-paced edited format which is often compared to MTV (Music Television). Some fear that this approach to reporting the news may be more entertaining than it is informative (Maynard, 1990; Tate, 1989).

The findings have not always been consistent, but in fact, some studies do suggest that factors such as story length, presentation, visuals and redundancy are major contributors to how much information is acquired and retained from TV news (Wilson, 1974; Findolh & Hoijen, 1985; Brosius, 1989; Drew & Reese, 1984). Other researchers found that when news has been produced specifically for their age group, children have a better knowledge of government and politics, as well as a greater interest in public affairs (Dominick, 1972; Atkins & Gantz, 1978). Klein (1978), contrary to those findings, reports no significant relationship between viewer retention and interest and the way a news show is produced. Other research such as that by Gunter (1987) has shown that viewers generally forget most of what they see on television news programs.

America's teenagers, it appears, don't often care enough about current events to begin with. A recent study by Times Mirror Corporation (Rosentiel, 1990) found that young people are indifferent to current events because they can't relate to them. Social studies teachers across the country have also lamented what is described as a woeful lack of knowledge on the part of American high school students when it comes to current events (Finn & Ravitch, 1987). Do students who view Channel One, a program designed specifically for them, learn more about current events than students who do not? How do attitudes toward Channel One relate to current events test achievement? Is there a relationship between the primary method of news consumption and overall current events achievement scores? What, if any, relationship is there between interest levels in current events and overall current events achievement scores?

Method

To assess what current events knowledge students learned from watching Channel One, the authors administered a twenty item multiple choice test on current events to tenth and eleventh grade students. The instrument was drawn, with permission, from a compilation of items supplied by a Midwest regional bureau of the Associated Press. Founded in 1848, the AP is used by more American television stations than any other news service. The instrument was pre-tested with a group of freshmen orientation students at Kent State University in the fall of 1991. Slight changes in the structure of the exam were made in response to written comments from students in the pre-test group.

Six suburban high schools in the Midwest took part in the study. All of the schools shared a similar demographic and economic composition. Three of the schools with 464 subjects received the Channel One program. The remaining 604 subjects did not receive the news show. Questions on the knowledge test covered national and international news, business and sports. The news quiz covered a two week period from October 14 to October 25, 1991.

In addition, the participants were given a brief survey regarding their news interests and media consumption habits. Participants from the Channel One schools were also surveyed concerning their attitudes about the news program. To assess which items on the AP news quiz were actually covered by Channel One, the authors conducted a content analysis of the two weeks of programming covered during the study.

Results

Of the 1068 subjects 51.5 percent were tenth graders and 48.5 percent were eleventh graders. Eighty eight percent of the subjects in this racially homogeneous sample were white. Thirty percent of all of the subjects in the study said they paid more attention to current events which deal with entertainment. Thirty seven percent paid more attention to sports, seventeen percent to crime stories and six percent to politics.

The subjects paid the least attention to current events which deal with education, (three percent) and health issues (two percent). An analysis of the test results between the control and experimental schools revealed that students who viewed Channel One scored forty two percent on the current events quiz as compared to thirty six percent for students who did not view the program, resulting in what amounts to a one question difference on the exam. The standard deviation, levels of significance and means for each group are reported in Table One.

Table 1

Knowledge Test: Main Effects

	Control	Channel 1
n	604	464
%	36%	42%
Mean	7.27	8.48
Standard Deviation	2.42	2.93
F	52.89	
Level of Significance	.000	

As shown in Table Two, the Channel One students scored better on eleven questions at a statistically significant level, while the control group scored statistically better on five questions. Of the correct responses scored by both groups, Channel One viewers scored at a higher statistically significant level on five of seven questions, while the non-viewers scored significantly higher on one quiz item.

As expected, most indications of interest in current events were positively correlated with higher scores on the Associated Press quiz. As shown in Table Three, high school students who were interested in reading about current events, as well as had discussions about the news with family and friends, scored higher on the exam. By contrast, the study did not find strong correlations between interest levels in news from electronic media and scores on the quiz.

Most indications of interest in current events were positively correlated with higher scores on the Associated Press current events quiz.

The study found few indications that students who feel positive about having Channel One in their schools will necessarily do better on current events. Although in response to the survey item which stated, "I feel that I am better informed about current events as a result of Channel One," there was a significance of .006 as it related to scores on the Associated Press quiz (See Table Four).

Table 2

Statistically Significant Differences on Specific Questions:

	Overall	Reported by Channel 1
Channel One Superiority	11 questions	5
Control Group Superiority	5 questions	1
No difference	4 questions	2

Table 3

Correlations between Interest Level and Scores on AP Current Events Test

Correlation	Significance	
.005	none	How many hours per week do you view television newscasts?
-.08	.007	How many hours per week do you listen to radio newscasts?
.13	.000	How often do you read newspapers?
.09	.004	How often do you read News Magazines?
.11	.000	I am very interested in current events.
.08	.006	I talk with my family and friends often about current events.
.09	.004	I am very interested in reading and watching TV programs about current events.

Table 4

Correlations between Attitude and Scores on AP Current Events Test

Correlation	Significance	
.04	none	When "Channel One" is on in my school I usually pay close attention.
.06	none	When "Channel One" is on my teacher stops all other classroom activities so that I can give the show my full attention.
.04	none	Viewing "Channel One" has made me more interested in what is happening throughout the U.S. and around the world.
.09	.04	I have discussed stories I have seen on "Channel One" with others.
.05	none	I have read about topics that I first found out about on "Channel One."
.001	none	I have listened to radio news or watched television news more often since my school began showing "Channel One."
.13	.006	I feel that I am better informed about current events as a result of "Channel One."
.04	none	I have learned some history from "Channel One" that enriched my understanding of what is happening in different parts of the world.
.11	.011	I think that my school should keep "Channel One."

The study revealed no significant difference between Channel One viewers and the control group subjects regarding what media were used to consume news programs. The subjects said that they viewed or listened to electronic newscasts about three and a half hours per week. Those who responded to the survey items said they also read newspapers about three and one half times per week, as opposed to one and a half times per week for reading news periodicals such as *Time* or *Newsweek* magazines.

Discussion

The overall percentage of correct responses by subjects in the control and experimental groups on the Associated Press news quiz, although statistically significant, is of questionable educational importance. However, there may be several valid reasons why subjects from the Channel One group did not score as well as may be expected on the test, although better than the control group. First is the format of the program. Two minutes of the news show are filled with commercials and very little of the remaining ten minutes is actually filled with "hard news." Roughly four minutes of the show has a "hard news component," and very often these stories are recaps or updates of news items that have run previously during the week. The other half of the news hole is filled with features or human interest stories. The newsworthiness of these latter stories may be questionable. Although these may be the kind of stories students want to watch as indicated by our survey results, they are certainly not the stuff of which Associated Press quizzes are made. Many of the stories covered by the Associated Press quiz were simply not included in the Channel One newscast, thus possibly a reason for the weak scores. But since Channel One can only cover a limited amount of material as already noted, perhaps 8 out of 20 questions is not bad. It should be noted that there was a significant difference in the scores of Channel One students on several of the quiz items which were recapped. This result seems to suggest one area in which Channel One does show strength.

Taking into consideration that 37 percent of all students in the study said that they paid more attention to current events which deal with sports and 30 percent favor stories which deal with entertainment news, it is not surprising that the scores are weak by conventional test standards. When this is coupled with the actual hard news component of the Channel One program the argument is even more compelling.

Another reason which may account for the relatively poor performance by the Channel One students is that some of the students may not actually watch the entire program, because of less than model viewing situations during homeroom and lunchtime (Tiene, in press).

The Impact: Other Studies

How do the findings of this study compare with other such investigations of Channel One? The body of literature on Channel One is slowly being developed with studies such as this one.

In general, much of the related literature confirms the findings of this study. Although most students seem to be paying attention to the program, it appears that the impact is neither dramatic as hoped for by its supporters, nor as negative as its detractors thought it would be (Rudinow, 1990; Graves, 1990).

Results from an experimental pilot study on Channel One show that students who viewed the program scored 53 percent on a current events test as compared to 36 percent for student who did not view the program (Rudinow, 1990). Another study conducted on students in a Cincinnati high school also reports higher scores in answers to test questions for Channel One viewers (Graves, 1990). Gorman and Primavera (1991) found the Channel One group had a correct response rate of 48 percent, compared to 38 percent for subjects in the control group. A similar study conducted on students in four suburban junior high schools in the Midwest, resulted in a sixty percent correct response rate for the experimental schools which viewed Channel One, while the Control schools scored 52 percent on the knowledge test (Tiene, in press).

By far the most comprehensive published study to date on Channel One has been conducted by the University of Michigan's Institute for Social Research in conjunction with the Interwest Applied Research Institute. Students from eleven schools in various regions of the country took part in this national study. Two current events tests were given within a four month period to students who viewed Channel One, as well as to students who had not seen the program. On both exams, the Channel One students exhibited a greater knowledge of current events as compared to the non-viewers, (3.3 percent better) getting only one more item correct on a thirty item quiz than the Control group (Johnson & Brzezinski, 1992). Obviously, the results of this study confirm these previous published and unpublished findings, albeit not impressively from an educational standpoint.

Summary and Conclusions: The Impact

Does Channel One have an educational role in our nation's schools? Should it? The jury may be decidedly still out on these questions. None of the studies on Channel One, including this one, has given it the resounding vote of confidence that its supporters have hoped for. Neither have the results indicated that it is having a negative impact on education (Streitfeld, 1992).

Perhaps, as it has been suggested, the real key to the program's effectiveness is linked to how classroom teachers tie in newscasts with other instruction (Supovitz, 1991). So while the educational gains from Channel One may at best be described as marginal, it is neither a "magic bullet" for meeting the current events learning needs of America's teenagers, nor is it a "smoking gun." The findings of this study do appear to show some evidence that Channel One is enjoying limited success.

It is now perhaps up to educators to take advantage of the hardware and other programs that are part of the Whittle package, to enlighten and enhance classroom instruction not only in current events, but in other areas of instruction as well.

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Viewers' Contributions to a Photograph

Anne L. Russell

Introduction

"I really like the way you have framed the girl sitting on the step and juxtaposed the poster on the door. She is wearing a dress the same colour as the girls' in the poster." Yes, I had framed the shot as I wanted it to be, but I had not been aware of the colour repetition. The viewer contributed to the photograph, something I, as the photographer, had not consciously seen or intended. The viewer added meaning to this photograph for me.

In the viewing of a photograph the photographer will bring the experience of being there, will recall selecting the parameters of the frame and usually recreate the emotional feelings and vision of the total environment beyond the photographic frame. On the other hand, the viewer, who was not behind the camera, and usually not present at the time of shooting, will bring different experiences to the two-dimensional photograph and respond in different ways.

Visual literacy is defined by the International Visual Literacy Association as "a group of visual competencies a human being can develop by seeing and at the same time having and integrating other sensory experiences"; and, "the ability to search for and evaluate visual information in visual media". These definitions suggest viewing visuals is a learned series of skills requiring a viewer to interpret and evaluate a visual through a number of senses. Are all the senses applied by viewers as they look at a photograph?

Elliot Eisner (1993) expresses his concern that 'visual learning' is not a priority in the educational agenda. He believes:

> Visual learning requires an individual to abstract from the world at large those visual qualities that are relevant to some purpose. ... Becoming visually literate is a way of comprehending what visual forms say and how they work (p.84).

Are there distinct ways a viewer comprehends a photograph? The study described in this paper will identify and characterize five different ways viewers conceptualize and take various stances towards a photograph in order to create personal understanding. The five different stances are Observation, Interpretation, Personal Memories, Participation and Medium Intrusion. Implications will be considered which encourage students to use these different constructs in the viewing of photographs.

The Photographer or creator of the image

The photographer decides consciously, or unconsciously, on how to position the elements of the scene within the frame. Consideration is made of lens, depth of field, exposure, film type, which elements to exclude and angle of view.

> For despite the widely held belief that 'the camera never lies', photographers can, through choices of what, how and when to take their pictures, exert a strong influence on how a particular

'reality' is depicted (Blyton, 1987:423).

The photographer 'sees' an event or a moment s/he decides to record. In recording the image on film s/he takes a 'minute time sample - a hundredth-of-a-second slice of reality' (Collier & Collier, 1986:13). This time sample is presented to show what existed at one time in a certain space. For Berger & Mohr,

> Photographs quote from appearances. The taking out of the quotation produces a discontinuity, which is reflected in the ambiguity of a photograph's meaning. All photographed events are ambiguous, except to those whose personal relation to the event is such that their own lives supply the missing continuity. Usually, in public the ambiguity of photographs is hidden by the use of words which explain, less or more truthfully, the pictured events (1986:128).

How is the ambiguity of a non-annotated photograph dealt with? How do viewers make meaning of an image presented without explanation? In daily living, and over time, individuals have come to learn how to make their own sense of images. While a photograph is a quotation created in a specific way by a photographer, each viewer brings personal experiences, expectations and a specific context to the photograph. These personal attributes influence how the viewer thinks about, and reacts to, the image in a particular way.

The Viewer or interpreter of the image

A group of people in the same context and given the same instructions for responding to a photograph will each bring personal expectations and experiences to their response.

The expectation of viewing a photograph and the context for viewing it can influence how an individual reacts to a photograph. In a learning situation, both the teacher and the learner will have preconceived ideas about the intended content of the image. Nevertheless, in one classroom there will be many different interpretations.

In their visual literacy education program, Buckle and Kelley identified three categories of response to photographs:

> Obvious observations ("This place is in a town or a city"), valid inferences ("It is most likely to be near the one-way system because of the right turn only sign") or judgements ("It brings out the busy, 'city gent' side of London") (1990:27).

Valid inferences may be true for the photographer and some viewers, but may not in fact have a basis for truth. It is this point when the inferences become judgements.

The contributions a viewer can offer in relation to a visual text has not been a major focus in visual literacy. Martinez (1992) writes of his concern with students of anthropology who construct textual meanings from film. He believes:

> We need to move from the dominance of author-text to a theoretical consideration of the viewer / reader as a powerful source of signification in the construction of anthropological knowledge (p.132).

Martinez (1992:133) says reception theories relating to literary texts "have been assimilated into mass media and film studies. These theories can be applied to visual texts".

Rosenblatt (1982:268) describes reading as a transaction or 'a two-way process, involving a reader and a text at a particular time under particular circumstances'. She suggests there are two stances a reader may take when interacting with text - efferent (seeking information) or aesthetic (creating a personal story).

Perhaps there are more stances a viewer can take when looking at a photograph.

The study

The aim of this study was to discover qualitatively different ways individuals respond to a photograph. The research questions were:

1. Are there qualitatively different stances individuals can take when they respond to a photograph?
2. Will the photographic content influence the qualitatively different stances in which individuals respond to a photograph?

The data for the study were gathered from several different types of respondents. A total of 384 written responses to a photograph were gathered. Respondents include 63 academic staff from Queensland University of Technology; 80 school teachers; 67 photographers from amateur Camera Clubs; and, 174 twelve year old school students. All respondents live in Brisbane, Queensland Australia. The percentage of males and females was not recorded.

Primarily written responses to photographs were elicited. Each person was shown a photograph and asked to write thoughts which came to his/her mind as s/he viewed the photograph. Respondents spent between five and ten minutes writing their responses.

In addition, 25 first year students in the Faculty of Education at Queensland University of Technology participated in synergetic focus group discussions where they discussed a particular photograph. The five discussion groups were recorded and transcribed and the transcriptions used in the analysis of the data.

In the case of the majority of the school teachers and University academic staff the responses were elicited in relation to instruction related to the Myers Briggs Type Indicator. In most cases the respondents were each given a 20cm x 25cm size photograph or the group was shown a slide. In two cases an overhead transparency of the photograph was used as the stimulus for response. The photographic camera club respondents were asked to write in response to a slide shown to the whole group as a preliminary activity before being introduced to the concept of different ways to respond to photographs and implications for Camera Club judging.

The data from each group were pooled to create one body of data. Analysis of data employed a phenomenographic approach to discover categories of responses which suggest different stances towards viewing a photograph.

No attempt was made to teach visual literacy to the respondents or to talk about different ways to respond to photographs. The photographs were not shown in a context which related to their content.

Two distinctly different photographic images were used in the research (see illustrations on following page). The first photograph was of five Indian children in the desert walking towards the photographer. The second photograph looks down on a car park where cars are parked within the marked areas of the concrete, one car has been burnt out. Both photographs were presented in colour. These two photographs were selected to provide a contrast in subject content to ensure the nature of the image did not influence the categories of response. In fact both images elicited all five categories of response.

Analysis of data

Though the data were collected in several different circumstances, the analysis was not focussed on differences between type of respondent. At this stage of the research it was important to consider the total data in order to consider diversity, and from this diversity to identify

'The Desert Children' and 'Car Park' photographs used for the study

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categories of qualitatively different types of responses to photographs.

A phenomenographic approach was used to analyse the data.

> Phenomenography is a research method for mapping the qualitatively different ways in which people experience, conceptualise (sic), perceive , and understand various aspects of, and phenomena in, the world around them (Marton, 1986:31).

Using this method, the data were analysed to provide categories of description which indicate distinctly different approaches viewers have toward a photograph. The individual respondent is not the focus of analysis, rather the variations of experiences are paramount in phenomenographic analysis. It was not, therefore, relevant to identify specific categories of respondent, instead all data were bundled together and treated as one unit for analysis.

The data were read and re-read to identify quotations which illustrated different responses to show a specific stance or approach toward the content of the photograph. Quotations from the data were grouped into categories according to apparent distinct stances. The categories were given names and then the researcher explained the uniqueness of each category to colleagues and photographers. Where the description of a category was not easily understood, the quotes were reviewed to identify if they were unique and needed renaming or whether they belonged in one of the other categories. The meanings of the categories became clear and descriptions of the categories were tested and adjusted and retested against the data. Quotations from the data illustrate how each category was exemplified by respondents. This process of phenomenographic analysis is further described by Marton (1986:42-43).

Results

Viewers contributed many different insights to both photographs. Each viewer brought personal experiences and expectations to create a personal response or stance to the photograph.

Five categories or stances were identified from the data:

Observation
Interpretation
Personal Memories
Participation
Medium Intrusion.

While each viewer normally took at least two stances when they viewed the photograph, they normally did not include all of the stances in their individual response. However, all stances were included in each group discussion where five individuals discussed one photograph.

Each category is presented with a description of meaning to show how the specific stance can be recognized and how it is used in written or verbal response to a photograph. The word 'elements' has been used in this context to indicate the visible images which appear on the surface of a photograph. These form the visual content of the photograph.

Observation

The photograph is seen as a series of observable elements. The viewer observes and tries to identify the visible elements contained within the photograph and verbally lists the visual contents. Detail seen by the eye is reported, clarified or described by the viewer. The photographic elements are objectively observed in their two dimensional context.

The Desert Children photograph elicited the following observation responses:

> *Sand, trees, desert, people, rocks, shadows, clothes.*

The first thing that struck me was their thin bony legs and arms and their thin little faces with dark circled eyes. Not one child is smiling.

The Car Park photograph elicited the following observation responses:

Geometric patterns of lines - fence, parking bays, angular shapes, pyramid arrangement of parked cars.

A series of cars in 2 rows, aligned at sharp angles, on a dark, ugly concrete floor.

Interpretation

The photograph is seen as a stimulus for interpretation. The viewer tries to create meaning from the visible elements, either singly or in combination, according to personal expectations and understanding of the context. Subjective meaning is verbally explained or questions asked which would assist in interpretation. Elements or combinations of elements in the photograph are seen and meaning is given by the viewer. The viewer's interpretation of the photograph may, or may not, be the intended interpretation of the photographer. The photographic elements are subjectively interpreted to create a context which is meaningful for the viewer.

The Desert Children photograph elicited the following interpretative responses:

Sickness, sand burning their feet, no learning facilities, beds (hard), sometimes happy, sometimes sad, hot in summer.

These children look quite forlorn and sad. The area also looks dry and hot. I wonder what the children do all day.

The Car Park photograph elicited the following interpretative response:

Did the damage happen in that location? If not why was it put there?

Little freedom. Only form of rebellion is to face the other way.

Personal Memories

The photograph is seen as a stimulus to recall personal experiences. The viewer 'leaves' the photograph in order to recall personal memories from the past. A story or stories are verbally recounted by the viewer. Visible elements or combinations of elements in the photograph may have stimulated the viewer's memory. The viewer's reflections may, or may not, extend the meaning in a way related to the intended interpretation of the photographer. The visible elements 'send' the viewer to a different environmental context.

The Desert Children photograph elicited the following personal memory responses:

They remind me of a very 'backward' community which I visited in Sumatra

Reminds me of the kids I saw in Egypt.

The Car Park photograph elicited the following personal memory responses:

Shopping - it reminds me of shopping and the to and fro to the carpark.

It reminds me of the story "Weight of Thistledown".

Participation

The photograph is seen as a stimulus for imaginative participation. The viewer 'enters' the environment depicted in the photograph as if participating in the scene, either from behind the camera or in front of the camera. The viewer's descriptions of elements beyond the frame of the photograph are often supported by descriptions of emotional feelings and kinaesthetic sensations. The imagined participation may not be the same as it was for the photographer. The viewer becomes engaged in the visible elements to the extent of imagining what it would be like to be there and so becomes involved within the environment where the photograph was taken.

The Desert Children photograph elicited the following participative responses:

> *There is a sadness and a longing about them and I would love to reach out and hold them - talk to them, play with them - be there for them.*

> *Village around on left of picture towards trees.*

The Car Park photograph elicited the following participative responses:

> *I feel like a bird looking down on a dreary parking lot. It is ugly and the Only thing that attracted my attention was the bright colours of the red and white cars.*

> *I am looking out the window of my office. It's just another sort of 'ordinary' day. The boss is here. I can see his flash blue car. Wonder who owns the others. I don't recognize them.*

Medium Intrusion

The image is seen as a specific communication medium related to the photographer and the camera as a recording device. The viewer considers the psychological or technical aspects of the medium. The viewer will raise questions or comments related to technical qualities of the photograph, the nature of photography as a medium, or, questions related to the purpose for the photograph. The 'noise' or intrusion of the medium may not have been intended by the author. The visible elements of the photograph, or the context of viewing the photograph, may encourage the viewer to dwell on the context of viewing, or the context of the production of, the photograph. The viewer leaves the environment created by the visual contents to explore aspects of the communication medium itself.

The Desert Children photograph elicited the following medium intrusion responses:

> *The photograph would stimulate discussion on [topics such as] where (which country), clothing, language, beliefs, is this a family group?*

> *I believe that the impact would have been stronger if the shot was taken in black and white.*

> *A tourist snapshot.*

The Car Park photograph elicited the following medium intrusion responses:

> *This slide was hard to look at due to 1. its position in relation to me, 2. from where it was taken.*

> *What a waste of film.*

Discussion

As a viewer takes a particular stance when responding to a photograph, s/he makes decisions regarding the social contexts of the photograph. The social contexts include identifying the conditions under which the photograph was taken and the context of present viewing conditions.

The photographer visually gives clues regarding the relationship s/he has with the visual content and the context when the photograph was taken. The desert children and car park photographs suggest two different contexts and stances. The subjective and personal perspective offered in the relationship between the photographer and the desert children is in opposition to the objective and factual stance presented in the car park image. The very use of the two words 'offered' and 'presented' in the previous sentence suggest a difference between providing content to be interacted with in a subjective manner and content to be taken as objective fact.

The desert children appear to be unfamiliar with the photographer and seem to question what the photographer has to offer them. There is a relationship between the photographer and the children. The viewers who responded in this research were predominately white Australians and related to the children as if they were from another culture. Subjective responses are given within the interpretation, personal memories, and participation categories.

The bird's eye view of the car park does not suggest a close relationship between the photographer and the visual elements depicted. It may be that the social context for the car park is much more objective in suggesting elements to be regarded as factual representations of reality. Objective responses are given within the observation and medium intrusion categories.

The two photographs were selected for the research as the photographer has taken different stances.

While it was not the intention of this research to determine the quantitative differences of response categories evoked by different types of image, both images elicited subjective as well as objective responses. Thus it appears the five identified categories can be applied to both subjective and objective image formats.

The viewer's social context when the photograph is viewed is important when considering how to respond to the image. In this research the researcher was known to the majority of the adult respondents. The knowledge that the researcher would be non-judgmental about the responses allowed the respondents to react as they wished. The student respondents did not know the researcher and may have tried to guess what was wanted. In both cases responses fell into all five categories.

When a viewer expects a photograph to give factual information, s/he will explore the image to find a reconstruction of aspects of the 'real' world. In Rosenblatt's (1982) view the viewer is taking an efferent stance in seeking information. The elements within the frame will be consulted to determine exactly what is present and how each element relates to each other (observation category). These elements will be further judged (interpretation category) and possibly related to relevant past cultural experiences (personal memories category) in order to integrate the new information gained from the photograph to present intellectual knowledge. The viewer will add to prior knowledge and create new meanings of reality based on interactions between the information presented in the photograph and prior understanding.

When the image does not conform to 'meaningful reality' the viewer may focus on technical aspects of the photograph such as quality of exposure, composition of the elements, or a concern about the purpose for the photograph (medium intrusion category). In this case the representation of the 'reality' is at odds with the viewer's perceived reality and this incongruity becomes a focus for the viewer.

A viewer who wishes to create meaning beyond a factual representation of 'reality' will approach the photograph with a different perspective. The viewer creates a personal story or personal meaning which does not need to relate to the photographer's intended meaning. In Rosenblatt's (1982) terms this is an aesthetic stance. A more wholistic overview rather than a concern with specific elements will stimulate the viewer to move beyond the represented reality to other conceptions of reality or to conceptions of fantasy. In this case the interpretation (interpretation category) is not a judgement of the elements presented in the photograph. The personal memories category also falls into Rosenblatt's aesthetic stance as the viewer responds with the memory of a personal story. The aesthetic stance is also demonstrated when the viewer mentally transports her/him self to the context or environment (participation category) 'within' the frame and describes what it is like to be there.

Application to teaching and learning

In this paper I have concentrated on the viewer's responses to photographs. In developing visual literacy among students the five categories of response could be used as cues for different stances to take when responding to a photograph. In using the five stances it is interesting to note the kinaesthetic responses which are given when people take a participation stance. The act of imagining one is present in the scene seems to elicit tactile and other sensory sensations. This reflects the International Visual Literacy Association's definition which suggests integration of senses beyond seeing is important for development of visual literacy.

As indicated in the definitions of visual literacy, it is equally important for students to have the ability to create visuals. In this respect the five categories could be used as foci for making (framing, selection of perspective and technical aspects) a photograph. The student could take five different photographs of the same topic, from each of the five different stances presented in this paper.

Both the responses to photographs and the creation of photographs by students can be applied in instructional design when producers consider what type of responses will be elicited as learners view a photograph. The inclusion of activities involving students in making their own photographs to illustrate certain concepts can create a deep understanding of the nature of the concept.

Conclusion

Each viewer makes individual contributions to a photograph. A specific photograph can elicit many different responses which create new meanings beyond those intended by the photographer. The viewer can observe detail, interpret meaning, recall personal memories of other times and other places, and can imagine participating in the scene or being where the photographer was when the photograph was taken. In addition, the physical aspects of the photograph or concern about the purpose of the visual content may intrude on the message presented by the photographer.

When a number of viewers respond to the same photograph they will bring additional meanings to those of just one viewer or of the photographer. The combination of several stances taken when responding to a photograph will create a depth of meaning beyond initial understanding.

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Fun and Games with Photoshop: Using Image Editors to Change Photographic Meaning

Richard S. Croft

Introduction

Modification of photographs to enhance or change their meaning is nothing new. However, the introduction of techniques for digitizing photographic images and the subsequent development of powerful image editing software has both broadened the possibilities for altering photographs and brought the means of doing so within the reach of anyone with imagination and patience. Those who wish to convey a message using photographs now have greater means than ever before of assuring that the communication will be clear. This article is an informal survey of the ways that we can use image editing software to improve photographic communication.

Educators, among others, find themselves wishing to use the power of visual communication, but cannot be certain of obtaining a photograph which clearly and concisely carries the desired meaning. However, by using a package like *Adobe Photoshop*, we can make changes to an available photograph to increase the likelihood of the viewer interpreting the message as we intend. Types of image modification possible include improvements to the aesthetic quality of the picture, techniques for focusing the viewer's attention, methods of simplifying the subject, ways of adding meaning to the image, and transformations which completely change the meaning of the image. The following sections briefly discuss each type of modification, and show examples of some techniques for accomplishing each kind of change.

Improving Image Quality

A photograph that lacks aesthetic quality may prove ineffective in communicating a message. If the composition is distracting, if the image is "muddy," or if the colors seem unnatural, the viewer may not interpret the image correctly (or may not even look at it). Also, photographs may suffer defects resulting from dust on the negative during printing or damage to the film emulsion. Standard darkroom techniques can remediate any of these problems, but they require considerable skill and practice. Image editing software allows corrections to all of the listed faults by providing simple means for cropping, adjusting brightness and contrast, adjusting color balance, and retouching (painting away defects like dust spots).

Figure One illustrates the use of cropping to improve composition by filling more of the viewing area with the subject of the picture and also the effects of adjustments to brightness and contrast. (Since this article is printed in black and white, it will include no illustrations requiring color.)

Focusing Viewer Attention

When it is necessary to direct the viewer's attention to a specific element of a photograph, without completely losing the context, one may use one of a number of techniques. The most straightforward is to simply crop the image to fill the frame with the subject. However, at times the remaining background may still be too distracting. Under these conditions, an image editor provides the means of selectively altering either the main subject or the

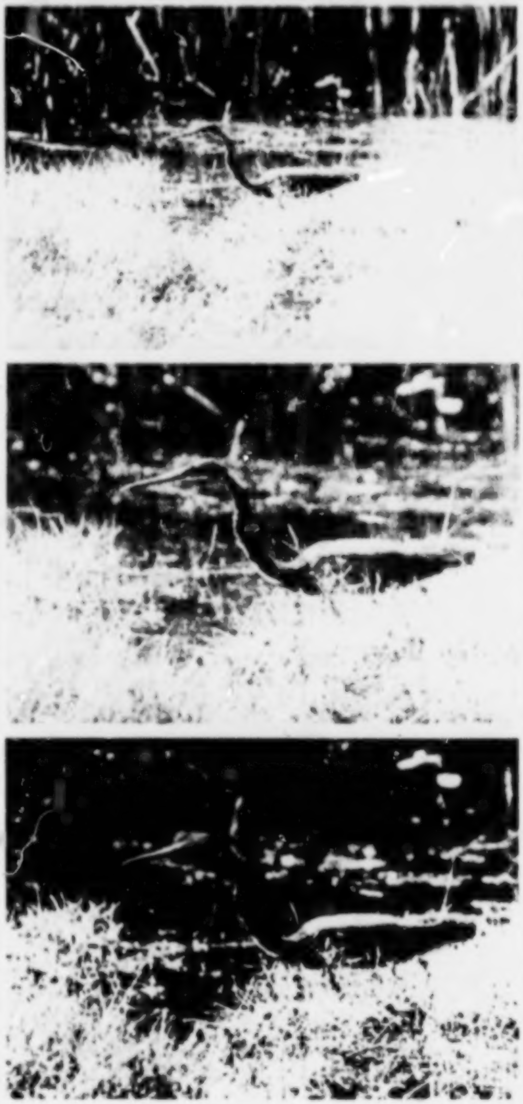

Figure One: A photograph before cropping (top), after cropping (center) and after adjusting brightness and contrast (bottom).

remainder of the image to provide emphasis to the desired focal point of the picture. Some techniques are: darkening the background, blurring the background, tinting the background, removing color from the background of a color image, or changing the background completely.

The choice of which technique one uses to emphasize the subject of a photograph will depend on the precise circumstances. Tinting a background is effective, but the results may look unnatural. Blurring a background looks more natural, but if there are any details of secondary importance, this may obscure them. Putting the foreground subject in a new background is effective only if the new background is truly appropriate. Figure Two shows several of these techniques applied to a photograph of a pelican on a dock.

Simplifying the Subject

Depending on the precise meaning we wish a photograph to convey, it is at times useful to remove some detail from the subject, leaving only those which are of interest. Image editors provide a variety of tools for removing details, so that one may either cut the subject out of the picture for placement on a neutral

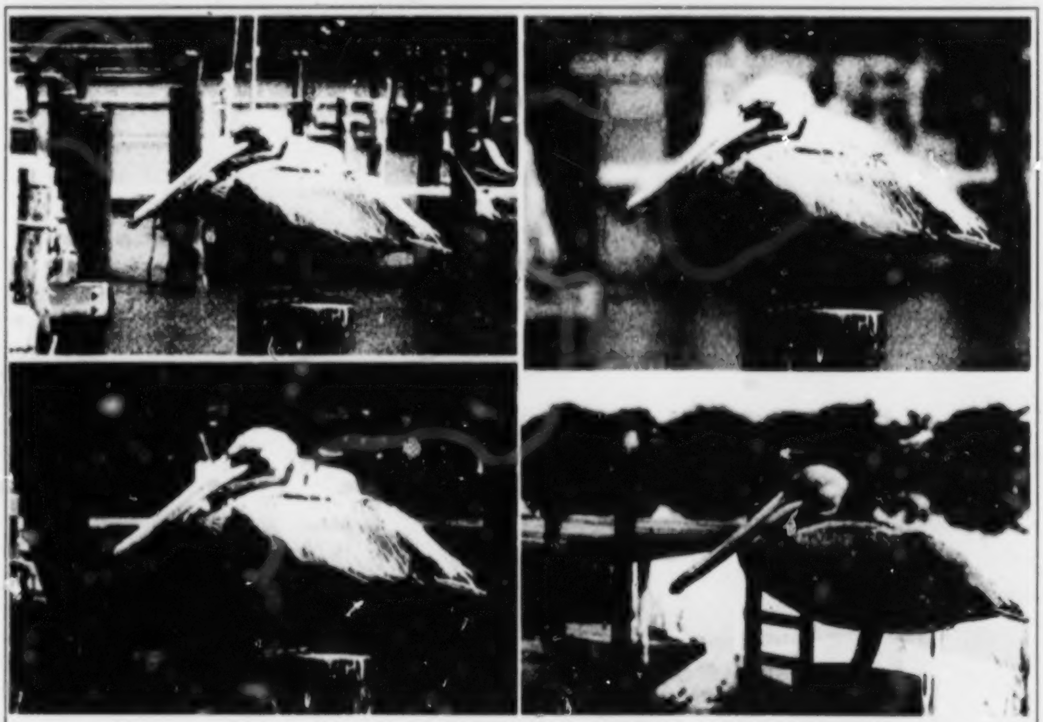

Figure Two: Focusing Viewer Attention. Before (upper left), blurred background (upper right), darkened background (lower left), and new background (lower right).

background; remove color (which may be distracting if the important details are form and pattern); blur interior lines, leaving only form and general coloration (a procedure called faceting); reduce the image to a line drawing; or even convert it to a silhouette.

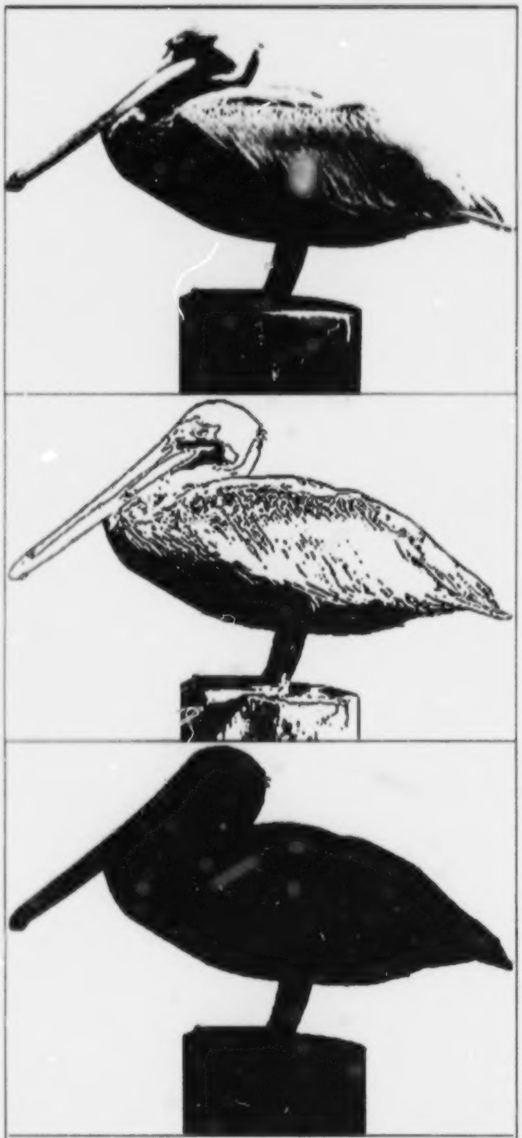

Figure Three: Simplifying. Top: A cut out image. Middle: Line drawing from the same photograph. Bottom: Silhouette from the same photograph.

Knowlton (1966) describes a taxonomy of visual representation based on the fidelity an image has for each of three attributes: elements included, pattern, and connections. Techniques for simplifying a photographic subject all involve maintaining realism (high fidelity) in at least one of the image attributes while reducing fidelity in one or both of the other two. Figure Three presents the pelican from Figure Two simplified in several of the ways described in the preceding paragraph.

Adding Meaning

While at times one may need to remove detail from a photograph, there are also occasions that mandate the addition of information to successfully communicate. For instance, one may add color to a monochromatic image of a deep-sea fish to show how it looks before it is brought out of the water. Other examples of adding meaning include annotations, enlarging of parts of the image, and compositing of drawn or photographic elements with the original photograph.

Annotation can take the form of text or lines and arrows, and provides a clear method of emphasizing

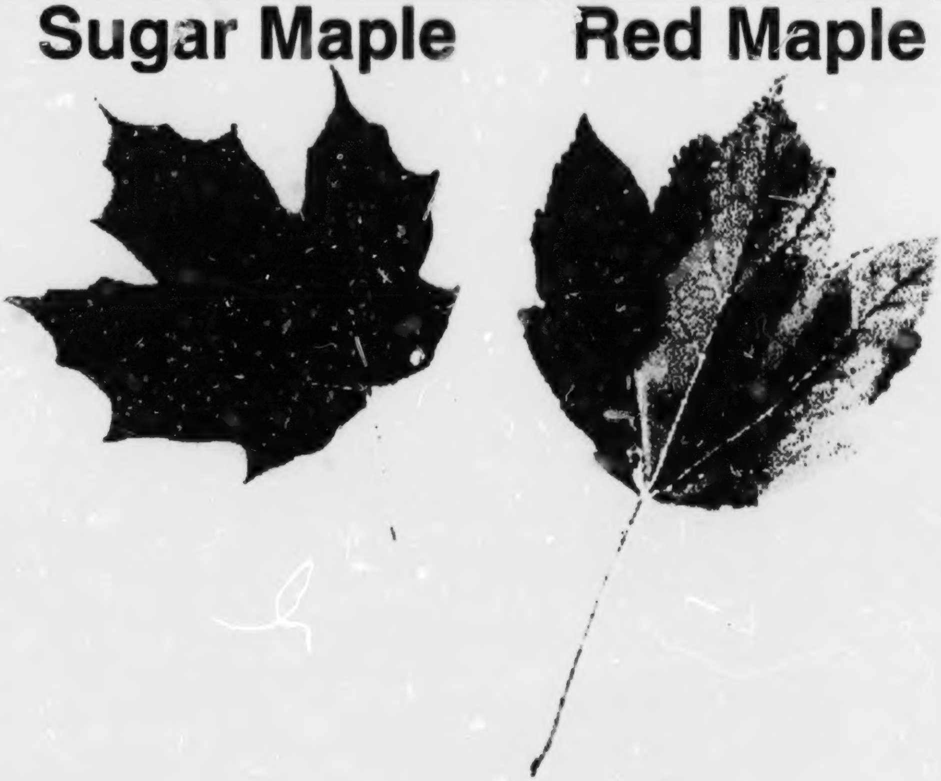

Figure Four: Adding meaning by using annotations.

specific parts of an image or simply identifying the image. Figure Four shows two maple leaves with a textual annotation identifying them as belonging to different species.

Enlarging a portion of a photograph can be very helpful in emphasizing specific details that might be difficult to distinguish in the original image, while maintaining ample context. Figure Five shows the same pair of maple leaves shown in Figure Four, with a portion of the leaf margins enlarged to illustrate the difference between the two leaves. An additional text annotation explains the enlargement.

Composite images are useful when we desire to illustrate with photographic realism some event or object that simply cannot be photographed. For example, an illustration of an animal's skeleton with a "ghost" image of the live creature superimposed, or a "photograph" of some historical event predating photography, may both be accomplished using digital composites. To illustrate the "living skeleton" would require a photograph of the skeleton

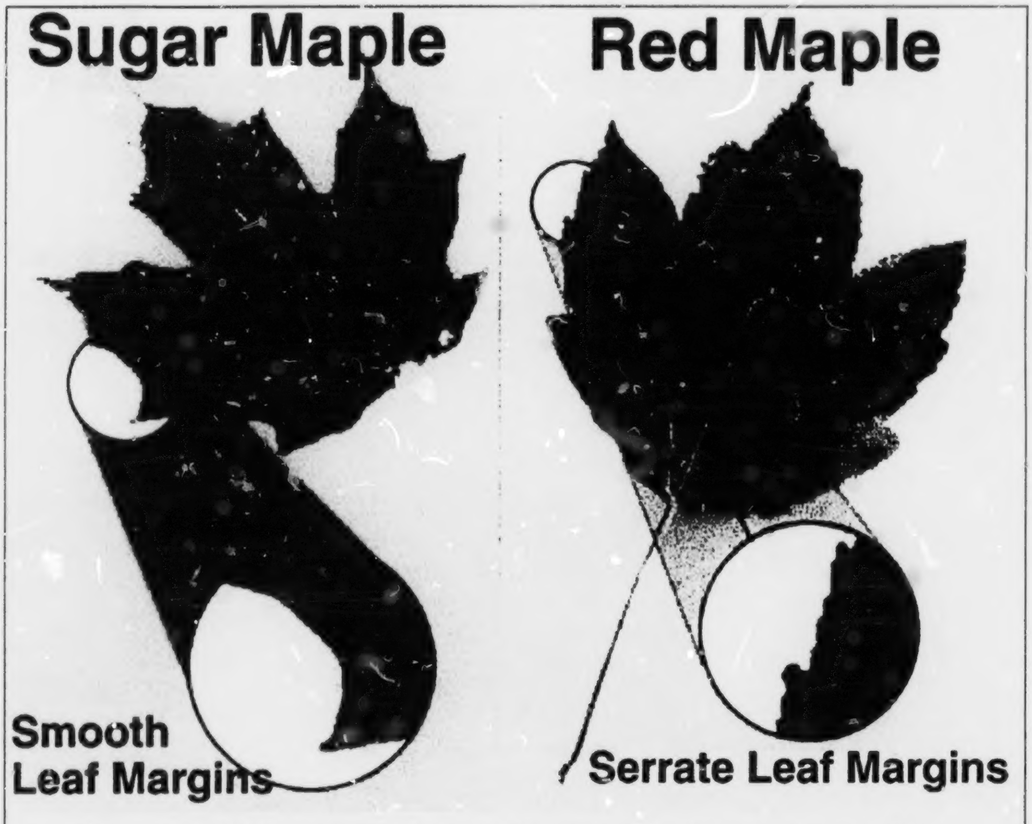

Figure Five: Adding meaning by enlarging parts of the image and annotating.

composited with a partially transparent drawing or photograph. The historical scene would involve compositing photographs of models (or actors) in appropriate dress with drawn or photographed elements. Figure Six shows the creation of a photographic interpretation of an early effort to ride over Niagara Falls in a barrel.

Changing Meaning

All of the previously described transformations result in some change in a photograph's meaning. However, it is possible to make radical differences in content. For instance, cropping a photograph of a man wielding a hammer may convert a carpenter into a much more sinister figure, and the careful addition of another human figure in the hammer's path will finish the job. A person who makes significant changes in a photograph's meaning may do so for the purposes of advertising, deception, artistic expression, or a combination of any of these.

Ethical Considerations

One immediate concern in the age of scanners, which quickly

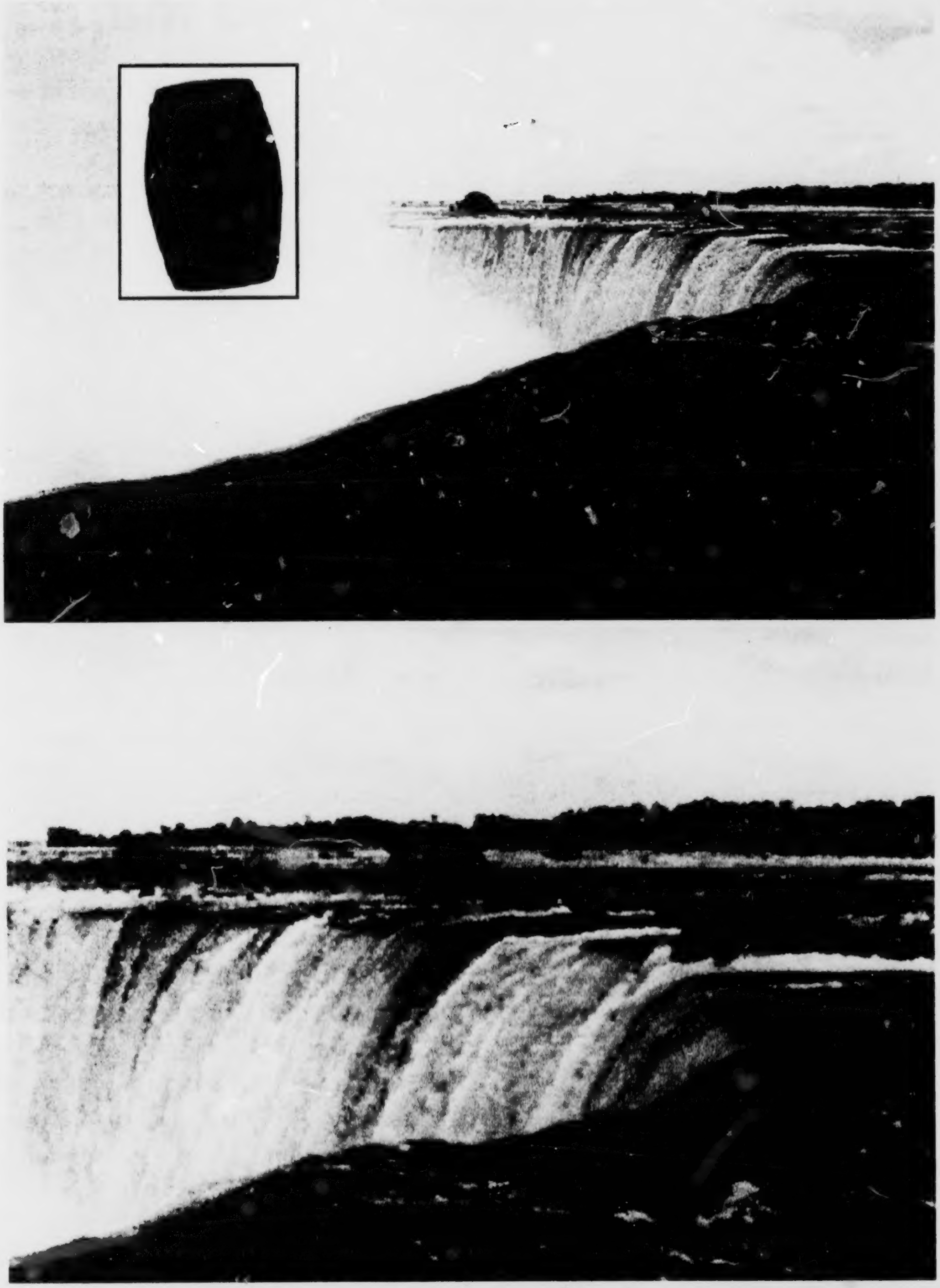

Figure Six: Creating a simple composite to simulate a "Barrel over Niagara Falls" incident. The barrel was painted in a separate graphics program. The last image in Figure Two shows another composite using all photographic elements.

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convert any artwork into a digital form, is that of copyright. Even though one may be able to easily obtain an image from any publication, it is important to remember that use of copyrighted photographs without the owner's permission is illegal.

A more subtle concern is related to the confidence many viewers have in photographic images. The degree of realism which digital composites may exhibit is both impressive and frightening, owing to the traditional faith in photographic veracity. For this reason, one must consider carefully how one applies changes in meaning, and if (for instance) one uses image editing to "recreate history" as described earlier in this paper, it must be clear to the viewer that the image is indeed an illustration, and not a record made at the time of the event.

Conclusion

The introduction of desktop technology greatly increases the possibilities for photographic communication. Even a person who does not have the time, equipment, or experience to make a photograph speak clearly should be able to find someone who does have the equipment and expertise. Given familiarity with the possibilities and sufficient imagination, one may now communicate almost anything with a "photograph." While this new flexibility and power can be used to further education and communication, they also hold potential for great misuse. Ethical practitioners will use them with care.

Caveats

The originals of the images appearing in this paper are color photographs belonging to the author, and were included in a presentation given at the IVLA 1993 Conference.

The poor quality of the pictures is an artifact of the printing process and not due to digitizing and editing.Novice users should note that image editing software requires fast desktop computers with greater-than-average memory and disk space. Furthermore, while many of the adjustments used to improve image quality are easy to learn (cropping, brightness and contrast, color balance), more sophisticated transformations require considerable time to learn. For effective use of any of the methods outlined in this paper, a thorough understanding of photographic principles is helpful if not essential.

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Since its invention in 1839, photography has been an integral part of recording events that have since become history. Understanding a nation's participation in wars is an important part of understanding its people and character. The United States Civil War was the first American war to be extensively documented by photographs. Although the use of photography had limited effect during the conflict, the photographs have had tremendous impact and importance in the over 100 years since the event. The lack of the technology necessary for efficient reproduction of photographs during, and immediately after, the Civil War impeded the use of photography for effective communication. With the invention of the half-tone process, which enabled mass-reproduction of photographs, public interest in the photographs was renewed. Historians and scholars at last began to realize the historical value of the photographs. Since 1866, countless books, magazines, documentaries, and movies have used photographs to communicate to the general public why the Civil War is such an important part of America's history. Photography has been a key to this understanding. It constitutes a host of visual primary sources that allow us to see the actual images of people, places, objects, and events long since gone.

The Civil War was not the first war to utilize photography. In 1920, a set of about sixty anonymous photographic plates from the Mexican War (1846-1848) was discovered. The British use of photography in the Crimean War was an important influence on photographers at the start of the American Civil War. Roger Fenton, the premier photographer of the Crimea, proved that war photography in the field was possible. The majority of photographs taken in the Crimea were of officers, camp life and the common soldier. Because they were intended to be shown to the royal family, few grisly photographs were taken. However, Fenton's published photographs helped convince American photographers that there was business potential for war photographs.

There were a number of technological advances in photography prior to the Civil War. In 1851, Frederick Scott Archer invented the wet-plate process which shortened exposure time; however, reproduction was still impractical and costly. The wet-plate process required on-site development, thus leading to the development of "whatsit wagons," the traveling darkrooms used by the photographers of the Civil War.

Photography had a limited impact during the war because the necessary technologies that increased its impact had not yet been developed. Portrait photography was widely viewed and popular. By the start of the war, Mathew Brady had well established studios in both New York and Washington, and numerous lesser known portrait studios were found throughout the country. Prominent figures from all aspects of society posed for Brady. Collections of the photographs in the form of "cartes de visite" (small portraits given in place of calling cards) and stereoscopic views became the rage. When war broke out, many soldiers visited these studios to have inexpensive photographs, called "tintypes," taken of themselves to send home to their loved ones as remembrances. In return, families of soldiers would have their portraits taken and sent to the soldiers to comfort them. Photographs were even used on campaign buttons, including one of Lincoln which prompted him to say, "Brady and the Cooper Union [speech] made me president." [1]

In the field, photography of the war was significantly more difficult.
The equipment was large and bulky. Sensitizing chemicals and large numbers of glass plates had to be transported. Groups of photographers could be found following the armies to battle The exposure time for wet-plate negatives, anywhere from 10 to 30 seconds, was so long that action shots could not be taken; therefore, photographers were restricted to photographing the aftermath with its corpse-strewn battlefields, bloated bodies, and rows of dead soldiers.

This *New York Times* review of Mathew Brady's 1863 exhibition on Antietam describes how battlefield photographs shocked the American public.

> The living that throng Broadway care little perhaps for the Dead at Antietam, but we fancy they would jostle less carelessly down the great thoroughfare, saunter less at their ease, were a few dripping bodies, fresh from the field, laid along the pavement...As it is, the dead of the battlefield come to us very rarely, even in dreams. We see the list in the morning paper at breakfast, but dismiss its recollection with the coffee. There is a confused mass of names, but they are all strangers; we forget the horrible significance that dwells amid the jumble of type...
>
> MR. BRADY has done something to bring home to us the terrible reality and earnestness of war. If he has not brought bodies and laid them in our dooryards and along the streets, he has done something very like it. At the door of his gallery hangs a little placard, "The Dead of Antietam." Crowds of people are constantly going up the stairs; follow them and you find them bending over photographic views of that fearful battle-field, taken immediately after the action. Of all objects of horror one would think the battle-field should stand preeminent, that it should bear away the palm of repulsiveness. But on the

> contrary, there is a terrible fascination about it that draws one near these pictures, and makes him loth to leave them. You will see hushed, reverent groups standing around these weird copies of carnage, bending down to look in the pale faces of the dead, chained by the strange spell that dwells in dead men's eyes. It seems somewhat singular that the same sun that looked down on the faces of the slain, blistering them, blotting out from the bodies all semblance to humanity, and hastening corruption, should have thus caught their features upon canvas, and given them perpetuity for ever. But so it is. [2]

These photographs were among the first images to show war from a realistic rather than a romantic view. Exhibitions, such as Brady's, drew large audiences. Yet, these images had limited impact because they could only be reproduced in newspapers as woodcut engravings; therefore, they were not seen by the majority of the general public. Newspapers mostly based their woodcuts on artists' sketches rather than photographs because sketches did not need detail for effectiveness. Sketches could capture the action of the battle making the woodcuts more dramatic, and often much more appealing, than many of the gruesomely realistic photographs. At times, photographers even rearranged bodies and equipment after the battles in an attempt to make the photographs more dramatic and appealing to publishers and the general public. [3] Despite these efforts the photographs never gained much popularity, and the vast majority of Americans were not greatly influenced by the photographs during the war because they did not see them.

In general, the public's perception of the significance of the photographs did not increase in the period immediately following the war. The people's desire to forget the war further hindered the use of photographs as communication.

> But interest in the war did wane almost immediately after Appomattox. Perhaps the market had been saturated by energetic purveyors of these images. More likely, Americans preferred not to remember the conflict they saw in the brutal reality of the photograph. Very soon myth and romanticism took the place of remembered fact. And the photos themselves were forgotten, misplaced, or deliberately destroyed. [4]

Alexander Gardner compiled and released his *Photographic Sketch Book of the Civil War* in 1866, with photographs taken by Timothy O'Sullivan and himself. [5] The book was a commercial failure. It was expensive because each of the photographs had to be manually reproduced and mounted on the pages. Moreover, the public was just not interested in the book; they simply wanted to forget the war. Mathew Brady invested approximately one hundred thousand dollars of his own money in photographing the war. Brady had relied on the sale of stereoscopic war views to return his investment. These views were popular during the war, but their sale almost stopped completely after the war. His photographic exhibitions, while well attended, did not nearly cover the cost of the photography. Brady had to give his creditors, E. and H. T. Anthony and Company, one of his sets of negatives to meet his bill. Brady entreated Congress to purchase two thousand portrait negatives in 1871, but Congress did not act. On account of the financial panic of 1873, Brady lost much of his real estate property and his New York gallery. He was unable to meet storage payments for his negative collection so it was put up for public auction and bought by the War Department for $2840. Persuaded by President Garfield, Congress gave Brady an appropriation of $25,000 for the collection.

The collection was poorly handled, resulting in many broken and scratched plates. The duplicate set of Brady negatives stored by the E. and H. T. Anthony and Company was virtually forgotten until rediscovered by John C. Taylor of Hartford, Connecticut in an attic. The collection was purchased by Colonel Arnold Rand of Boston and General Albert Ordway of Washington, who carefully preserved and catalogued the negatives and periodically added to the collection. [6] Many negatives were stored by other collectors, veterans' societies and the photographers themselves.

> They were the keepers of the image, men with an appreciation-and a vision-that others lacked. Finally, just before the turn of the century, their hour, and that of their photographs, came at last. It arrived on the wings of technology, the development of the halftone printing process. At last, photographs could be easily and speedily "printed" in massive quantities. At the same time, there was a new generation of Americans who had not lived through the war, who did not feel the old pains revived by seeing the graphic destruction depicted in the photographs. The people and the image were ready for one another. [7]

When reproduction became easier, historians began to fully realize the significance of the Civil War photographs and started to use them in books, periodicals, and eventually movies and documentaries. The first of these books appeared in 1894, *The Memorial War Book* by George F. Williams. Williams' book was just the beginning. In 1912 the ten-volume *Photographic History of the Civil War* was published. Its editor, Francis T. Miller, and his associates, spent years contacting former soldiers, generals and photographers. [8] Roy M. Mason was hired by Miller to search the South for war photographs. The result was a monumental accomplishment containing thousands of photographs reproduced from the original prints and plates. The accompanying text was often provided by Civil War veterans. New technologies led to publication of these and other books which made the photographs accessible to a larger audience.

Interest in the photographs of the Civil War continued to increase. In subsequent decades, numerous Civil War movies, such as *Birth of a Nation* (1927), *Gone With the Wind* (1939), *The Red Badge of Courage* (1951), and more recently, *Glory* (1990) were produced. Often these films referred to Civil War photographs for set and costume reconstruction. Many of these movies fell short of authenticity with scenes being overly dramatic, even romanticizing war. This contrasted with the initial impact of the Civil War photographs of the 1860's which did much to dispel most people's glorified image of war that was seen in the paintings of the period. [9]

In the *Photographic History of the Civil War*, many romantic ideas are reiterated. Allan Trachtenberg compares captions in the Miller series with Gardner's captions:

> The 1911 text describes it as a scene of troops en route to battle...The text weaves the image into a narrative of the 'eve' of the first battle of the war, a moment of lighthearted innocence, laughing young men 'hardly realizing in the contagion of their patriotic ardor the grim meaning of real war.' The picture shows something else...The Gardner text is more explicit in detail...Gardner's text saturates the image, encouraging the viewer to incorporate its details into a generalized narrative of war as a disruption of nature. [10]

Miller and his collaborators accepted idealizations and did not question captions given to the pictures by the photographers and press in the 1860's. Thus, many errors were passed on from the *Photographic History of the Civil War* to subsequent books.

In 1975, William A. Frassanito sought to correct some of these errors. Frassanito analyzed hundreds of Civil War photographs to determine where, when and by whom they were taken. By studying the photographs, he was able to determine if, and in what way, the bodies were staged by the photographers. Frassanito shot the scenes again so that he could better understand the original photographs. However, the photographic conditions were not exactly duplicated because he used modern cameras with lenses that were not equivalent to those used by Civil War photographers. Frassanito published three books: *Gettysburg: A Journey in Time*, *Grant and Lee: The Virginia Campaigns: 1864-1865* and *Antietam: The Photographic Legacy of America's Bloodiest Days* in which he dispels many of the previously unquestioned captions and titles. [11]

From 1981 to 1984, a six-volume series, *Images of War*, containing hundreds of previously unpublished photographs appeared. [12] The *Image of War* series tried to correct many of the errors found in the captions. In the late 1980's, an exhibition and corresponding book entitled the *Eyes of Time: Photojournalism in America* were presented. [13] Both covered how the use of photography in the Civil War related to and affected the use of photojournalism in the nineteenth and twentieth centuries.

Photographs have been important in helping both historians and the general public gain an understanding that is more detailed and realistic than that of previous wars which relied only on artists' representations. In 1990, Ken Burns released his ten hour documentary, *The Civil War*. [14] The documentary integrated the photographs with other means of communication, such as narrative, letters, diaries, and music, to increase the impact the information would have on the public. [15] Some historians are bothered by the documentary's lack of accuracy in the use of photographs in relation to the narrative. [16]

> I look for what I call an equivalent - that is, an image that may not be what an expert would certify as belonging to the precise moment I'm describing, but that combines with the narration to make a synthesis that's good history, so that you say, "My God, I

> hear that. I know what they must have felt." [17]

Nevertheless, Burns' documentary brought an understanding of the conflict to a large viewing audience. The effectiveness and impact of this documentary could not have been achieved without the availability of photography as a means of communication. The photographs brought the viewers closer to the people and events of the Civil War by letting them feel the emotions of both the ordinary soldiers and prominent figures in the period. The detail of the photographs made the war, and the people involved, seem more realistic than wars and participants rendered by artists' interpretations only. When paintings and photographs of the time period are compared, the importance of the photograph becomes more apparent because details omitted in a portrait of Lincoln are clearly seen in a photograph of Lincoln. [18]

The significance of the photographs has increased immensely since the Civil War. For, as the decades passed, the people who had first-hand knowledge of the Civil War died, leaving historians no choice but to rely on forms of recorded information to understand the war. Photography has provided society with an extensive record of detail in uniforms, weapons, forts, and a soldier's camp life. Battle-maps can be reconstructed from photographs. The photographs confirm letters, diary entries, and other written correspondence. When compared with photographs from subsequent wars, similarities give history a feeling of timelessness.

In many ways Civil War photography actually seems to foreshadow the recorded image of World War II. A photograph of the dead against a fence on the battlefield of Antietam is a companion piece to a scene of corpses along a hedgerow on the battlefield of France made some 80 years later. Together they seem part of one time-almost the same war, a part of the same continuing series of organized struggles which have characterized human history.

> The living skeletons of Union soldiers released from Andersonville prison in 1865 cannot be distinguished from similar photographic records of the victims of the Belsen concentration camp more than three-quarters of a century later. [19]

Because of photography we now have a record of the people who so greatly shaped our country. The detail in photographic portraits provides a wealth of information on the personalities and emotions of both leaders and common people. One can look at portraits of Lincoln to see the emotional and physical toll the war exacted on him. Photographic portraits allow us to observe the changes in Lincoln by comparing photographs taken at different times during his campaign and presidency. Comparing a photograph taken on February 27, 1860 at the time of the Cooper Union Institute speech during his first campaign [20] with a portrait taken on November 15, 1863 [21] three years into the war, the lines on his face are markedly deeper. A photograph taken on April 9, 1865 five days before his death is one of the few pictures taken of Lincoln where he is smiling. He had just heard news that Lee had surrendered to Grant. [22]

Photographs can never be a complete factual source because the viewer can only see what the photographer decided was important to see. The photographs can never be looked at from the perspective of someone who was alive during the war. They will always be viewed and studied from a modern perspective.

> After 100 years or so, photographs no longer trigger the living memory of a concrete experience, but become historical abstractions which can only help another generation imagine how it was. [23]

Wagner described Civil War photography as a type of "time bomb." There were immediate effects, but the aftershocks are immensely more important. They provide the key to understanding an event in our country's history, the Civil War, that has a profound impact on the development and character of the United States. [24]

We will never know what it was like to be at the Brady exhibition of black and white photographs from Antietam in 1863. We do know that Civil War photographs command interest even today. When photographs of soldiers killed in Somalia or Bosnia are shown on television in schools, some students laugh as a body explodes. This may be because so much violence is seen on entertainment programming, actual war photographs no longer seem real. On the other hand, war photographs have increased impact now because they are seen by more people immediately, and the impact of war photography today is also increased by advances in camera technology and media presentation techniques.

Photographic images can now be edited and reproduced without using film or chemically based processes. Technologies such as high-resolution desktop scanners, image processing software, Photo CD and continuous tone printers are gradually replacing traditional chemically produced imagery. [25] Today the analog image from the television camera can be easily converted to digitized format and manipulated through the computer. The content of a photograph printed on photographic paper can be scanned into a computer, stored and manipulated as a digitized image. This phenomenon of the electronic darkroom has important implications for photographic archivists.

Historians use the word "provenience" to describe the history of a photograph's origin and ownership including changes in context or technology which have affected the photograph and its interpretation. When changes in form, content or context that affect interpretation can be identified, the historical value of the photograph is preserved, and the photograph can be used as documentation. The historical record of the photograph is intact when changes in the prints can be noted and analyzed. With Civil War photographs, for example, the original glass plate was usually cleaned and reused. Second and succeeding generation copies became the historical record. Although the original plate may no longer exist, the likelihood of changes from the negative to a contact print is minimal because the technology was relatively primitive. Digitized photography makes it almost impossible to detect changes made by editing.

Thus, it becomes increasingly important to have access to the original photograph and information about any subsequent changes made by photographers or editors. If the original photograph (the negative) is preserved, then a trail is left for history's detectives. The value of the photograph as "evidence" is enhanced by a record on film and by documentation of the changes at all stages when digitized imagery is used. Regardless of how the photograph is produced, it is important to remember that:

> The camera is the eye of history
> ...you must never make bad pictures.
> ...Mathew Brady [26]

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Introduction of Technology into the Art Curriculum

Ann S. Dana

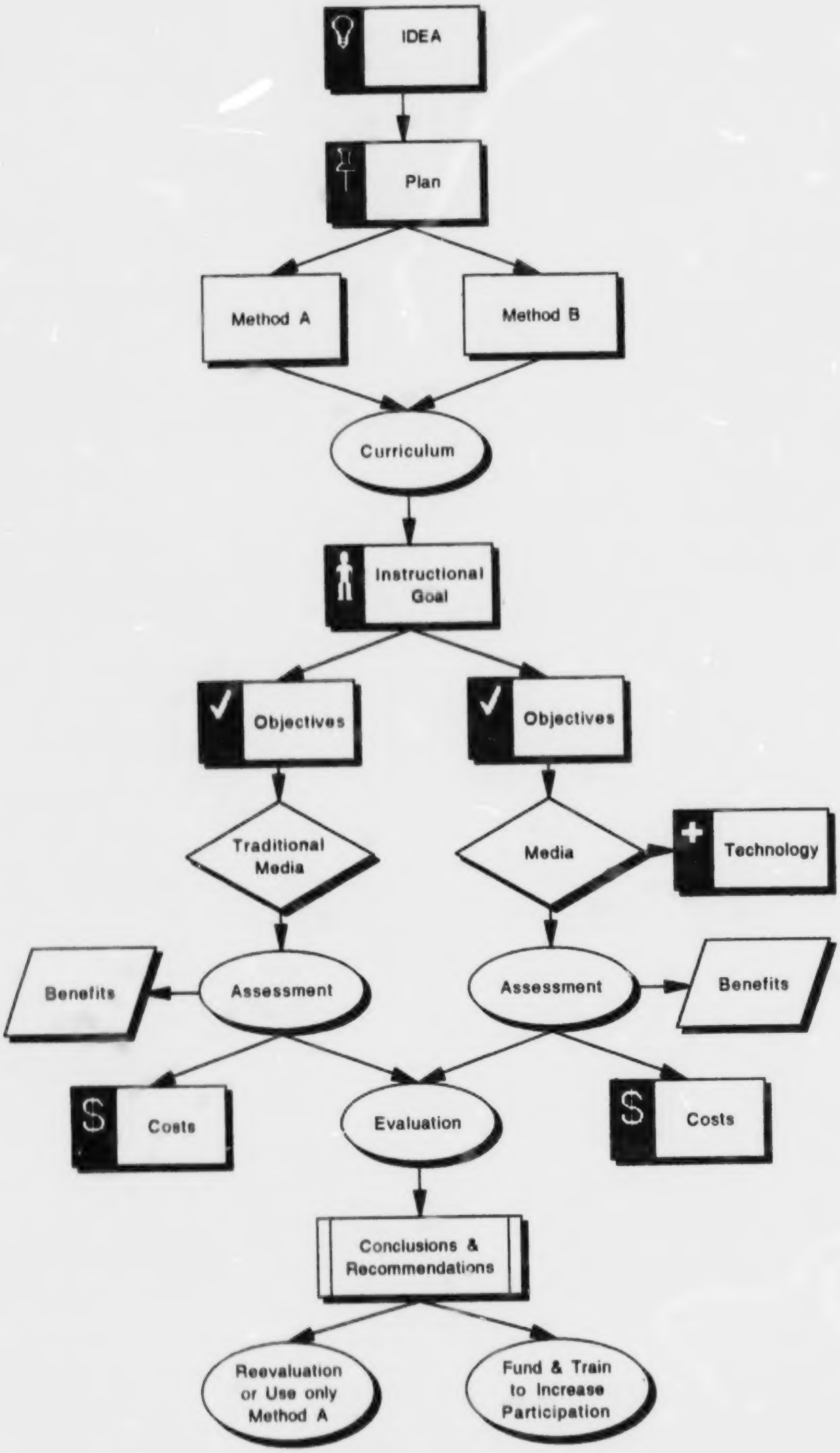
Integration of technology into the curriculum is necessary for a better understanding of its importance to the students of today (DeMichiell, 1990; Gibbons, 1988; Goodson, 1991). According to Hunter (1989) there is a need for students to be capable of visual patterning. By incorporating this training into the curricula a greater awareness will be the result (p. 236). Thornburg (1991) stated that the classroom computer has become an expressive tool for discovery and true learning, only limited by the extent of one's imagination. Nancy Scali (1989) remarked that a child's visual expression supports healthy self-esteem. Scali proposed that computers and art provide the extension for a child to develop creative powers and positive visual communication. Ragan and Rezabek (1987) expressed that as the computer allowed the user to adjust and revise, engage in precision activities, duplicate images, activate memory capabilities, and manipulate images, it was a tool for use in visual literacy worth exploring. Gunderson (1993) stated that students can be taught art criticism, aesthetics, art history and studio projects using many different media including technology. Metallinos (1993) stated that art created by a particular society serves at least three major purposes. These are to illustrate the basic values and beliefs of the society, to promote the society's basic philosophies, and to fulfill the needs, aspirations, and desires of the people of the society (p. 456).

Technology will have a bearing on the future careers of the children of today. School districts have a financial burden, feeling the pressure of the public to be accountable. These two factors helped to influence the development of initiatives to put technology into the curriculum. Historically the school district felt justified to be equitable in the distribution of funding and in the purchasing of technological tools, hardware and software.

Background

Planning the Initiative

The initiatives gave permission by the school board to spend money differently, favoring one class or one school instead of equitable distribution over the eight district schools. An initiative starts with an idea for using technology as a tool to help to present or support curriculum. The initiative presents a methodology for change. A requirement is that the traditional methods must be evaluated and compared to an evaluation of the newer method, including costs, time spent, as well as assessment of the learning. A format was generated for teachers to use to help in the planning. The district technology specialists acted as guides in the process, helped refine the plans, suggested the best technology to use, and well costed out the plan. When the plan was refined, it was presented to the Board of Education who approved or suggested the need for refinement.


IDEA
Plan
Method A
Method B
Curriculum
Instructional Goal
Objectives
Objectives
Traditional Media
Media
Technology
Benefits
Assessment
Assessment
Benefits
Costs
Evaluation
Costs
Conclusions & Recommendations
Reevaluation or Use only Method A
Fund & Train to Increase Participation

Concept Map: Plan of an Initiative

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Criteria

The district developed form provided the outline. Applicants filled in the instructional goal, the objectives, itemized costs, and listed the benefits of both the traditional method (Method A) and the planned method (Method B). they added what would be different using technology. The procedure for assessment of both methods had to be outlined. An important criteria in the initiative was what was or what would be the benefit to the students. The costs of the technology component were added by the technology specialists who also projected the costs to the district that could be expected if the initiative proved to be of greater benefit to the students than the traditional method.

Curriculum

Two of the initiatives that were approved involved the art curriculum. The district's art coordinator designed the initiatives with involvement of the middle school art teacher and the director of technology. Computer aides were also trained to oversee the labs. Both art initiatives were designed around the existing art curriculum that emphasizes the elements and principles of art.

Inservice

Inservice plans were considered in costing out the initiative. Planning time, reviewing software, training of staff, hiring substitutes were all considered. The district has a negotiated hourly amount that is paid for time spent over and above the school day. Some of the training was conducted by the technology specialists without any additional costs.

Costs

The cost of the art initiative at the third grade level at its inception was zero. There were ten mouse units available to be borrowed and the school also borrowed a lab pack of the software that was not being used at the Middle School. Due to the success of the initiative, the PTO purchased mouse units, lab packs of the software and color ribbons to be able to continue to use the graphics program after the initiative was concluded. If the initiative were to be a district program the total cost would be $4154, a cost of $11.87 per student.

The cost of the Middle School Art Initiative included the cost of the software, the color printer with additional color cartridges, and the scanner. The Macintosh LC II's were already in place. It amounted to $22.49 per student. If a separate lab with 15 computers were to be purchased, the cost would be $72.36 per student.

Hardware

The district computers consist mainly of the Apple II family. Most of the eight schools labs of 12 to 24 systems. The offices are all Macintosh and a recent addition was a writing lab of 15 Macintosh computers at the Middle School. Nine of the computers are LC's and were selected for the Middle School Art initiative. The Middle School initiative also involved the acquisition of a scanner and a color printer.

The writing lab is equipped with a Macintosh Quadra 950 that networks all of the computers and a laser printer. Because of the Quadra and the network, students' art files could be stored, retrieved, edited, and refined. Projects of more than one session could be accomplished. Other hardware in the middle school lab included a laser disc player with a monitor.

Software

Dazzle Draw by Broderbund, for the Apple IIe or Apple IIgs with a color monitor and a mouse, was used in the third grade art initiative. The software has the capability of using 16 colors plus color patterns that can be edited. There are four brush sizes and shapes. Shapes can be outlines or solid. Tools include Mirror, Shapes, Fill, Zoom, Spray Paint, and Text. There is an undo feature and drawings can be printed in color with an Imagewriter II printer with a colored ribbon.

EZ-Color Paint by MECC, for the Macintosh, has 256 colors, many palettes of colors depicting differences such as winter, earth tones, rainbow. The tools are more sophisticated but easy to learn. The graphic interface of the Macintosh gives easy access to all of the capabilities. It is possible to edit tints of colors.

Third Grade

The elementary initiative involved two third grade classes and their teachers, the art teacher, the district's technology director, and the computer lab aide. Lessons were developed coordinating the principles and elements of art as taught in the art curriculum for that grade level. The software used was *Dazzle Draw* by Broderbund on Apple IIe computers equipped with a mouse and color monitor. This initiative lasted six weeks, including the presentation of the students' projects to their parents.

Elements of Art

The educational objective for the elementary project was to introduce students to computers and computer software as tools and media for creating art. These were in addition to the traditional art tools and media, brushes, pencils and so forth to create drawings, watercolors, sculptures, and others. It was to provide an opportunity for the students to practice artistic skill and concepts through computer graphics.

At the time of the planning there was no sequential curriculum based studio experience for elementary computer graphics. The experience would be an opportunity to assess the feasibility and place of computer graphics in the art curriculum.

Reinforced Curriculum

The art curriculum as introduced by the art teacher involved media and color theory such as warm, cold, complementary, elements of art such as balance, and principles of art such as rhythm. Students used a variety of media including cray pas, poster paint, water colors, crayons, and clay to create individual art works. The benefit of adding the computer as a media was to add more diversity in approaches students use. Experimentation would be favored over the acceptance of a first effort. The computer allowed for the reinforcement of learned elements and principles in an arena that encouraged the practicing of artistic skills.

The series of lessons in this initiative were designed to give students several experiences with the technology (hardware and software) and to reinforce the lessons previously experienced in the art room. The first lesson introduced the mouse and the software. Using the text tool they learned to click and select various choices. The final project was to type the words tiny, huge, round, and happy and change the size and style of a font to have the words appropriately displayed. Experimentation came from those students who discovered how to color the background or build boxes around their words. In this software the letters can only be white. When students returned to their classes, they filled out an evaluation sheet that briefly asked them what they had learned or were able to do.

The second lesson, a lesson on symmetry was a follow-up to an off-line art period experience. The mirror tool was used and students were introduced to the color possibilities. They were to choose either warm or cool colors. A discussion took place before the computer experience on color theory with students reviewing the differences between warm, cool, and complementary colors. A color wheel was on display.

The third lesson reinforced shapes and balance composition concepts. The computer experience introduced the shapes and the fill tools. They also learned they could edit the designs that could be used to fill the shapes.

The next experience was a review of complementary colors that they were to use in the creation of a background to which they would add a figure or figures in a bright color to show contrast.

The final lesson was a Cityscape, a lesson on perception of things that could be drawn to represent the city. This culminating project was assigned in coordination with an art/social studies emphasis on Chicago. In art class, students depicted a Chicago place, person or event in their choice of media. The computer assignment also had an element of choice of cityscape subject matter and use of graphics media.

Extension of the Curriculum

The students' art work was printed and compared with work done in the art room. Computer graphics assignments gave students opportunities to use concepts introduced in art in a different context. The graphics pictures were simpler and less detailed than art room work. Computer graphic tools and capabilities for color and texture manipulation resulted in richer and more sophisticated use of these elements than possible with art class media. On the computer, as in the art room, students appreciated the opportunity for "learning to make their own things."

Students were videotaped as they introduced their art work to an audience, explaining what it represented. The students completed a written evaluation of the initiative projects from their point of view in preparation for a public speaking presentation of the project for parents. Evaluation questions related to attitude towards the project, what graphics tools were used most successfully, interpretation of process and meaning of pictures, and how lessons connected with understanding principles and elements of art. Most students comfortably participated in the public presentation. Students were very articulate and confident in communicating the meaning of their work, what they had learned, and their opinion about the initiative.

Middle School

The art initiative at the Middle School was designed to give advanced art students an experience that was relevant to art as used in more of a commercial atmosphere. 75 seventh and eighth grade introductory and advanced art students rotated out of the 6th and 8th period art classes into the Macintosh lab. Computer graphics are familiar to them in their exposure to commercials, MTV, Nintendo, and film. It was important to give them some understanding of the talents and tools behind these innovations.

Nine color Macintosh LCII computers were available for two periods during the day. The lab was equipped with a Macintosh Quadra 950 which allowed all of the students' computers to be networked to the Quadra and the laser and imagewriter printers. The color printer was not on the network. The software used was *EZ-Color Paint* by MECC. In our research, this was the most economical for the capabilities. All of the computers also had HyperCard on the hard drive.

The two art classes were divided into 4 groups. It was planned to give all students at least 2-two to three week experiences in the Macintosh lab. It was important that all students stay in the art classroom for the first three weeks to be introduced to all the elements and principles of art plus lessons on contour and on right brain drawing.

It was necessary to change the computer graphics lessons as the semester progressed and students came to the lab with different exposure to art media.

All students needed a lesson on the use of the lab and the software. Learning how to save and retrieve using the network was a necessity. Art graphics take up so much memory, it was a decision not to have students use floppy disks.

Learning to use the software began with an extension of the art class curriculum by having the students do a modified contour drawing of a jars or bottles that were set up as still life models between each two computers. They experimented with line size, shading, shadows, and light source. For many this was a true learning experience with using the mouse as an extension of their hand and mind. They quickly learned the tools that could help them edit. Written evaluations were used to help them to think about this experience and relate it to something else. Although most related it to the art class experience, some reflected that "it was like the first time they learned to draw" or "drawing with my left hand." These black and white drawings were printed on the laser printer in gray scale.

The second lesson was designed around shape. It was also a black and white experience and the experimentation involved creating optical illusions with lines and shapes.

The third lesson began as a black and white but changed to the first color experience. There are many choices of palettes in *EZ-Color Paint.* The goal was to create a three dimensional model by using different tints of the same color. They found that changing palettes completely changed their model, usually not for the better. Discoverers found they could repeat the shape in a different tint instead of using the paint brush. A later group found the blending tool and the fill bucket that would shade the shape almost instantly. By teaching each other, these ideas were quickly passed from one to another. However, as in most things, the purist kept to the original task. They could choose their best to be printed on the HP color printer.

Scenes and Color Change

The National Gallery of Art laser disc gave students a background in how an artist using the same scene will paint it at different times of the day or at different seasons. Monet and the Rouen Cathedral series was one example. The assignment for the students involved creating a black and white scene, saving it as a template, and experimenting with a minimum of two different color palettes. Many students related the scenes to a personal experience or an interest. They might chose pastel for one and bright hues for the other, or experiment with warm and cool colors. During the Art Fair, the three were hung together to show the effects of color.

Xap-Shot Camera Portraits

Students' portraits were taken with the district's xap-shot camera. Using Computer-Eyes these digitized portraits were moved into *EZ-Color Paint*. Before experimenting with changing their image, two artists known for their experimentation with photographs and portraits, Andy Warhol and Ed Paschke, were viewed and discussed.

Using the same idea of having a template, the students renamed the portrait so they could experiment. They learned to cut and paste, to resize, to experiment with a variety of color tools with the goal of presenting themselves differently. They had to be able to explain what they did and why they chose to do so. They presented their portraits to the total art class. Although most eventually felt free to change their images, some only added to the periphery, not willing to appear differently to their peers.

Animation

A final experience in the Macintosh lab was to create animation using HyperCard. This is one experience that is impossible in the art room. Making flip books was a homework assignment so they could understand what HyperCard was really doing. This also helped them to plan how each image had to be slightly different than the one before it. Students learned how to create a background for their image and put navigation tools in place. They learned to cut and paste and place their image from card to card. The goal was 10 cards but some became so involved 30 was not unusual. One student had such an extensive image, it was better to keep the image on the background and change the scenery on each card. The effect was the same. When all of their cards were completed they finished the title screen with the name of their animation and added a button with a special script that when clicked would automatically show all their cards putting the animation to work. It would return to the first card when completed. They printed out their cards, 8 to a page.

During the HMS Art Fest '93, these images plus many of their other products were put into *Kid Pix Companion* and presented as a continuous slide show for the parents to view. 99 images can be stored in one show. The images had to come from the Quadra as disks hold only a few and even the hard drive would fill up.

Time

The timeline for development of an initiative to its approval and implementation maybe as long as 6 to 12 weeks or longer. This is due to taking the idea through the development stages. The plan is designed and refined, the costs of implementation are gathered, and approval finalized. Once the initiative is approved, it is necessary to obtain the hardware and software, start to gather the data on Method A, inservice any staff that will be involved and set-up a timeline for implementation. If a pretest is to be administered that must be done at the onset. Continuous data must be collected during the implementation.

Evaluation

Evaluation of all initiatives had to be based on the effectiveness of meeting the goals and objectives. There could be a combination of qualitative and quantitative data. A pre-test/ post-test format could be used. Student work could be collected from Method A and compared to student work from Method B. Attitude surveys to staff and students might be administered. New initiatives for the 1993-1994 school year must have some quantifiable data in order to follow the district's strategic planning guidelines.

Third Grade Initiative Evaluation

The third grade art initiative worked as a model because of excellent communication and cooperation, between classroom teachers, art teacher, computer aide, and the Director of technology. Homerooms were divided into two groups per class for graphics instruction so all students had their own computer. Use of the designated homeroom computer period, the computer aide reinforcing art room concepts in pre-computer discussion, and opportunity for on-line learning, provided students a loop for application and transfer of art curriculum concepts outside of the art room. Student written evaluations, the computer graphics, and the feedback from the computer aide, proved to be an excellent evaluation of how well students understood concepts taught in class.

It was concluded that this model should be replicated in elementary buildings at third grade for a six to eight week session in the same basic format as the initiative, including the public presentation piece. The Art Curriculum Committee should consider using technology as one means of assessment for third-grade art curriculum outcomes, based on the initiative evaluation format, benefits, and results.

The school board was very receptive to the continuance of this initiative. The art curriculum committee is researching how this would affect each of their schools. At the present time it has been decided that the same students, now in the fourth grade, will combine art and social studies to use *Dazzle Draw* to create Native American designs. In their study of the Native American cultures they are discovering that the colors, designs, and symbols used depended upon the location of the various cultures in North America. system.

Middle School Art Initiative Evaluation

The middle school art initiative followed a similar evaluation procedure. The students filled out evaluation sheets following each project. Art room projects and computer graphic portfolios representing exceptional, above average, and average ability students in art and computer graphics respectively, were selected for comparison of student achievement based on abilities in art and computer graphics.

- Students were given a pre and post art concept questionnaire

- Art class/Computer Graphics teachers conferenced with students concerning art class and initiative projects during development, completion and critique.

- Students completed written evaluation/ critiques of the initiative lessons/ projects

Evaluation by their peers and parents

All advanced art students shared their portrait projects (studio art - Paschke, and computer art - Paschke or Warhol) with their peers in a whole art class experience. It was evident that there was an increased level of art literacy as students unconsciously used 3 levels of art criticism: description, analysis, interpretation, as they critiqued their work.

The second opportunity came with the HMS Art Fest '93 where parents and other interested adults came to the computer lab and students showed the techniques they had used for their exhibited art work. The whole school was filled with projects from the art classes. The computer lab was the display area for the computer generated projects. Very positive feedback from the parents was evident.

Recommendations

- The computer art experiences available as part of the art program.
- Advanced or independent study art students participants in the computer art experiences.
- Flexible scheduling to allow for varied lengths of project time for both art and computer graphics.
- A computer time-share arrangement developed for four or five students to use 4 or 5 computers in reasonable proximity to the art room.
- Supervision arranged for students' computer art experiences .
- Inservice for graphics art supervision provided.
- Each unit of study in the art program proceeded by an introduction and followed by a whole group critique and/or by a written evaluation.
- Formal instruction in critiquing, followed by practice, a whole class experience.
- Curriculum and scheduling correlated so all the art students receive the same instruction and similar experiences and opportunities.

The school board approved the initiative and plans to continue it with advanced art students are being made. Small groups of students will go to one of the math classrooms to use the five computers of the newly approved math initiative. A Centris 8/230 will act as the server for storing the art projects. The scanner and color printer will be part of the hardware. The only cost for the continuation of the computer graphic program is the Centris and inservice for the instructional aide that will supervise the art students.

Summary

The two art initiatives were a successful implementation of a new approach to blending technology with the curriculum. The need to give students real life experiences that make them aware of the impact of the visual world, gives credence to technology use within the art curriculum. The computer is a way of life and although considered just a tool, Bartscherer and George (1989) stated that tools have an effect on one's thinking and capabilities, and therefore on the results. "The computer is a unique tool, because it can have an impact at many different stages of the design, development and execution of a product. It can act as a thinking tool, a sketch tool, a drafting tool, an editing tool, a visualizing tool, a computing tool, or a production tool" (p. 32). The authors encourage students to note which kinds of shapes and textures can be created easily and which are more difficult; how easily modifications can be done; how line quality is achieved; how illusion of depth or transparency can be achieved, as they are learning to develop their designing skills. It is important that we do all we can to ensure students have these experiences.

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The Artist, the Color Copier, and Digital Imaging

Mary Stieglitz Witte

BACKGROUND

In 1938 Chester Carlson produced the first electrophotograph. His 1939 patent, described the 'electrophotographic copying apparatus' which would evolve into the first commercially successful photocopier. The Haloid Corporation developed Carlson's process, and as Haloid Xerox, released the Xerox Model D in 1950, and the celebrated Xerox 914 in 1959. Artists experimented with photocopiers as soon as copy machines appeared in worksites. Artists were intrigued when full color copiers appeared on the market. The 3-M Color-in-Color System I was introduced in 1968. By 1970, Sonia Landy Sheridan established a program in 'Generative Systems' at the Art Institute of Chicago which incorporated this new color copier Sheridan described the program as one "which brought artists and scientists together, ... an effort at turning the artist's passive role into an active one by promoting the investigation of contemporary scientific-technological systems and their relationship to art and life."[1]

As the seventies proceeded, artists were working with the 3-M Color-in-Color System I and II, and with the Color Xerox 6500. Xerox and 3-M both employed three-color systems and light-lens technology, which offered potentials as well as limits. The Xerox 6500 dominated the color copier market during the seventies and eighties. These first color copiers offered opportunity for creative imaging, considerable manipulation of colors & images, and the transfer of images to a variety of other surfaces. Color copiers became a new tool for artists, photographers and designers. They provided opportunity for direct, spontaneous image making with potential for new transformations.

'Electroworks', a major copy-art exhibition was installed by the International Museum of Photography at George Eastman House, Rochester, New York, in 1979. The exhibit included a varied collection of two hundred and forty-five works ranging from experimental photomontages to limited edition books and clothing. In the catalogue, guest curator Marilyn McCray referred to copy art as having "generated activity all over the world. These highly stylized and individualized works of art are collected by major museums and sold by art dealers and galleries for prices that amaze the inventors of the processes and the pioneers of photo-copier marketing."[2] The exhibition clearly demonstrated the potential of color copiers as tools for the visual arts.

In 1982, the Centre Copie-Art was established in Montréal (Québec), Canada. The Centre's replete blend of exhibitions, workshops, research, and catalogues, promoted the meeting of art and technology. Jacques Charbonneau, founder and managing director, described the Centre's research consequences: "Many artists arrived to a new perception of a great creative power which was unsuspected prior to the works made thanks to the Centre."[3] The Centre's main goal is to integrate copy-art into the field of visual arts. The Centre Copie-Art closely cooperates with the Museum für Fotokopie in Mülheim, Germany and the Museo Internacional de Electrografia in Cuenca, Spain, as well as other copy-art centers worldwide.

Philippe Boissonnet described the Centre's ongoing 'Artist in Residence Program' as dealing with the expressive and plastic potentialities of the equipment, the unexperimented and free exploration . He cites intent to "create works which would be one-of-a-kind, which would be *original* as contrasted to *a copy*. The idea: try to outspace the limits which are intrinsic to the "copigraphic tool". The idea: to feature some of the plastic characteristics inherent to the medium."[4]

In 1982, Louise Odes Neaderland founded the International Society of Copier Artists in New York City. Neaderland reports that the impetus for founding ISCA was the lack of opportunity to share and show copier art. The Society promotes and recognizes the use of the copier as a fine art tool. Neaderland continues to direct ISCA and publish the *ISCA Quarterly*, of which one issue a year is dedicated to bookworks. This annual 'box of books' is a favorite of both artists and collectors.

Artist members include printmakers, painters, photographers, graphic designers, book artists and computer graphists. More than twenty-five museum and institutional members worldwide subscribe to the *Quarterly*, a limited edition journal composed entirely of original art. ISCA also mounts traveling 'Iscagraphics' exhibitions, and maintains an extensive slide archive in New York.

NEW DIRECTIONS

In 1988 the Canon Corporation began marketing its Color Laser Copier, the CLC 1. This full color digital laser copier revolutionized the color copier market with digital scanning, a four color system, high resolution, and a wide range of manipulative capabilities. The Canon CLC was the first of many full color copiers to be introduced into this rejuvenated market in the late eighties and early nineties. Kodak, Konica, Minolta, Mita, Panasonic, Xerox, Richoh and Savin also market color copiers. The related proliferation of full color digital printers, plotters, bubble jets, ink jets, thermal transfer and similar devices also increased the hard copy alternatives available to visual artists.

The current generation of digital color copiers allows increased opportunity for new directions in imaging. The switch from light-lens to digital laser scanning vastly expanded copier capabilities. Digital technology offers greater user control, versatility in creative editing, and resolution. Laser scanners 'read' the image, capture the image digit-by-digit, and process the information by computer. As input, the copiers accept color negative or positive transparencies (photographed or hand-made), prints, or actual objects on the glass. The new machines print on a variety of surfaces, and in dimensions from standard stationery to billboard size.

Some of the new color copiers have peripheral units which allow the copier to accept input from a variety of sources, including computer files in several file formats, video signals, and CD-ROM imagery. This continuing integration of digital capabilities has created many new tools for the artist. Innovative electrophotographic technology and digital connectivity will break down prevailing boundaries and generate new art forms.

DIFFERENTIATION

The distinction between digital (discrete) and analog (continuous) representation is significant. Digitally encoded and computer processable images are clearly distinguished from that of their photographic predecessor. Critical factors include differing amounts of information, and differing characteristics of replication and manipulation in each format. Digital information is easy to manipulate, recombine, and transform.

William J. Mitchell discussed the quandary of an era when artists celebrate the potential of digital image manipulation, and the press calls for a code of ethics to regulate manipulation. Mitchell noted that we may "...see the emergence of digital imaging as a welcome opportunity to expose the aporias in photography's construction of the visual world, to deconstruct the very idea of photographic objectivity and closure, and to resist what has become an increasingly sclerotic pictorial tradition."[5] He also observed that "After more than a century and a half of photographic production, we also have to contend with the powerful 'reality effect' that the photographic image has by now constructed for itself."[6]

Digital imaging has jolted this reference with its new conventions, understandings, transformations, and forms. Although we may be aware of the differences between objects and their photographic representations, the traditional assumptions about the 'reality' of photographic images is one problem, and the manipulations possible with digital images create an even greater quandary.

REPLICATION

Digital imaging diminishes the customary differentiation between unique originals and multiples, much as photography affected painting in the ninteenth century. The photocopier denies the provenance and authenticity of time and place traditional to the arts. The fidelity of the new copiers diminishes the conventional differentiation between original and copy. Replication is precise and indeciferable from the original. Appropriation is quick, effortless, and can be seen as a concern or an opportunity.

Margot Lovejoy writes that "In a sense copier technology represents the act of appropriation itself and stands out as a site for the Postmodern because it addresses directly questions having to do with the copy and the original, authorship and originality."[7] She further notes that "The use of the copy ... is one of the new strategies of postmodern artists who are appropriating images and styles of the past to critique the conventions of art history itself -- to deconstruct or unmask the modernist notion that the "original" and "originality" rightfully dominate in assigning value to art."[8]

REPERCUSSION

Questions usually arise concerning the validity of art done via machine. Some ask if the mark of the human hand isn't necessary to art. Are mechanical tools the preserve of the unskilled? Do copiers encourage illicit appropriation? Can a mechanical system produce works of art that are unique, personal, of aesthetic value?

Repercussions to machine-aided art are not unique to the twentieth century. With the proliferation of photography by the mid-nineteenth century, painter Paul Delaroche is traditionally acknowledged as pronouncing 'From this day painting is dead'. Baudelaire is also said to have offered his observation that 'Industry, by invading the territories of art, has become art's most mortal enemy'.

Photography and industry were not fatal to painting and art, but the visual arts were immutably affected. Artists embraced the new technologies and expanded their selection of tools and media. Just as photography proved to be a means of expression, creation, and communication; electrostatic media, computers, and electronic imaging now offer new modes of visualization. New technologies applied to art offer potential for new constructs, both visual and conceptual. Therefore, one rejoinder is to recognize the significance of the artist's concept above the tool, material or process. The originality of the visual statement does not depend on the rarity of the image, the laboriousness of handwork required, intricacy of process, or tradition of the tool.

TRANSFORMATION

The current generation of digital imaging is marked by transformation, mutation, proliferation and velocity. Traditional concepts of image originality and control are being challenged, and a syntax of copier imaging continues to develop. The images surveyed in this presentation offer a look at current contexts and aesthetic organizations, and perhaps a notion of future directions. Mitchell comments that "Digital imagers give meaning and value to computational readymades by appropriation, transformation, reprocessing, and recombination; we have entered the age of electrobricollage."[9]

The **slide survey** constitutes the 'eye' of this IVLA presentation, and exemplifies some of these new visual paradigms. These images, with statements by the artists, speak eloquently. Many of the artists in the slide survey have had considerable influence in the use of color copiers as a tool/medium in the visual arts.

THE SURVEY

The slides present a visual survey of selected contemporary artists in North America and Europe who utilize color copiers in their work. This sampling provides a rich repertory by over twenty diverse artists exhibiting new visual paradigms. Artists approach color copiers with diversity, spontaneity, a sense of discovery, exploitation of the technology, and elements of play. The opportunity for artist/machine interaction affords the potential for new combines of art and technology, and a fresh repertory of forms, methods, communications, and interpretations. Many artists attempt to demolish the confines which are intrinsic to the photocopier. Every tool offers particular limits as well as potentials to be considered. The immediacy of photocopier production is a factor which appeals to many artists.

Artists utilize color copiers with vast divergence. They differ greatly in what they *bring* to the copier. Some use the machine as a large camera, bringing a variety of objects, images, and materials to the copyboard glass. One artist may use a color copier to create a visual diary or self portrait, another may use it as one would employ a small press. The artist may bring to the copier a prepared 'master' image, often a collage or synthesized work, and then utilize the copier to print the desired number in the edition. Lovejoy notes that "David Hockney calls the collection of office copiers in his studio *magic new presses*".[10] Some artists print a specific edition, signing and numbering the edition in the tradition of the printmaker. Others tap the 'press' as needed, often varying the prints and producing unique works rather than editions. A considerable number of artists use color copiers as a production tool for limited edition art books.

Other artists use color copier prints as intermediary images. One example is using the copier as a device to produce elements for the construction of a final collage or composition. The artists then fabricate one-of-a-kind works with color copy elements. An interesting paradox exists in this use of a machine engineered for duplication, employed to create unique, one-of-a-kind works of art. Diverse manipulations during printing, or of the print afterwards, also result in unique images.

Another example of the color copier as intermediary tool, is work transferred by heat or solvent transfers to other surfaces. This often produces a softening and/or transformation of the image which enhances the unique quality of these works.

This presenter's experience with color copiers began with the 3M Color-in-Color System I, later the Xerox 6500, and was reactivated by the Canon CLC 1. My work explores perceptual relationships, especially figure and ground interplays. With a photography background, I am challenged by both the meanings my images communicate, and the perceptual aspects of those images. Digital tools allow me to release my photoimages from their conventional frameworks and spatial cues, challenging these traditional concepts. Multiple layers of images are combined both physically (via collage) and electronically. Figure/ground interplays allow new interconnections and relationships. They play among visual and perceptual codes, assist the perceptual plays and ploys, and attempt to expand ways of both objective and subjective knowing.

CONCLUSION

The near wizardry of digital color copiers and related computer tecnologies is reminiscent of the magical quality attributed to photography in its early years. Debates will likely escalate as digital imaging becomes a global representation, just as photography did in its first 150 years. The ease-of-use and efficiency of digital copiers and technology contradicts traditional controls of artistic replication and distribution, and challenges conventional concepts of 'value' in art.

Image form, meaning, use, and value will essentially change. Digital imaging offers potential for new constructs, both visual and conceptual ... and will permanently transform the visual arts.

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[7] Margot Lovejoy, *Postmodern Currents: Art and Artists in the Age of Electronic Media*, Prentice-Hall, Englewood Cliffs, NJ, 1992, p.110

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[9] Mitchell, op cit, p.7

[10] Lovejoy, op cit, p. 115

Decoding Photocopy Humor

Dan Kerns

> Images and interpretations may have a life of their own long after we have forgotten how they originated.
> Robert McCormick Adams, *Smithsonian* 1991

INTRODUCTION

In examining effects of media, one area has been overlooked by researchers. This area is older than the more studied medium of television and potentially has the same kind of effects on the viewers and consumers of the medium in relationship to formulating and reinforcing stereotypes. Photocopy humor is the medium of which I speak. The following paper will discuss in detail the reasons for researching this as a scholarly topic. The potentially, negative and damaging effects caused by viewing the message and the hidden, imbedded meaning contained in the visuals and textual material will be examined. Additionally, generalizations will be drawn to other forms of media, implications for education, direction for future research and some concluding remarks.

Definition of Photocopy Humor

For the purposes of this research, photocopy humor is defined as any facsimile, photocopy and wire copy line drawings, iconography and textual material which was drawn or written for distribution to a larger select audience using the available technology of the period to disperse material intended for humor. The use of the term photocopy humor intentionally excludes professionally produced cartoon and humor books and materials. Although some items included contain elements which were at one point professionally produced, they have since been altered significantly.

On first glance photocopy humor may seem to be somewhat trivial in nature, a less weighty topic of research. But just as cave drawings are researched to discover more about ancient man, the content of photocopy humor gives insight into the individuals who create, share, distribute and perpetuate the use of technology in the pursuit of folly and/or social commentary. The ills of society, prevailing attitudes and topics for discussion are present in the simple line drawings or phraseology.

The paper will discuss the potential effects photocopy humor could have on the viewing audience's development of stereotypes. The content of photocopy humor narrows in on stereotypical aspects of subjects such as ethnic heritage, gender, age and socio-economic status to name a few.

Generations are dealing with the "value programming" which occurred as a result of being exposed to the media. The term "value programming" comes from Morris Massey's film *What You Are Is Where You Were When* (Massey, 1975). From the first glance at the world around us at infancy, individuals begin the process of obtaining values. Massey contends these values are "programmed" into individuals by sources such as the media, our family, friends, the church and school one attends and so forth. We are shaped by our experiences, which shape our outlook and values. He postulates that these values become "locked in" around the age of 21 and from that point forward we are a reflection of our value programming. As adults, throughout our lives, we are value relating to society based on the values programmed into each of us before we reached the age of 21(Massey, 1975).

As humans, we tend to seek out and attend to images and messages which are congruent with our beliefs, values and attitudes. We define what is "right" and "wrong", "good" and "bad" "normal" and "not normal" and so forth based on our value programming. This value system is what we use to filter the events and people who come into and out of our realm of experience. All have their own value system under which they operate. What one individual deems "normal" and "good," others may find objectionable. This is particularly true in a free society such as the US where individual thought and expression is constitutionally protected.

Free speech and communication of thoughts and ideas have generated controversy as to the acceptability of certain messages. Regardless of the medium, print, broadcast or lecture; all have had fringe topics which raise the question of acceptability or the appropriateness of the communication activity. Purveyors of messages considered to be in poor taste or even pornographic contend it is their right to use the medium to express their opinions and thoughts as they see fit.

Photocopy humor is no exception. Just as home videos range from Disney cartoons to triple X-rated, so does photocopy humor. Some of the content in photocopy humor could be classified as cartoon pornography. Given this fact, we shouldn't ignore the study of photocopy humor because some of the material is unpleasant, objectionable and personally distasteful to view. Nor should objectionable material be excluded from study on the grounds that it is objectionable. Indeed, some of the examples cited in this study could be considered in very poor taste, but it is necessary to include these items to accurately define State A—what is.

Many parallels can be drawn between photocopy humor and research conducted on ethnically and sexually based humor in that photocopy humor often draws upon these two topics for subject matter. Both subject matters are often found to be controversial and in poor taste. But who defines poor taste. Ted Danson, former star of *Cheers* has found not all are amused with racial slurs. In a October 8, 1993 Friars Club roast of Whoopi Goldberg, Danson came out in black face and uttered a racial slur over a dozen times. Goldberg, who is black, didn't find the material objectionable. "I don't care if you don't like it. I do," Goldberg stated (Peoria Journal Star, October 9, 1993). It has been reported that many who attended the roast were offended, including New York Mayor David Dinkins and talk show host Montel Williams. This example illustrates the problem in defining acceptability of the content of a message. Personal standards vary widely between individuals of like and unlike demographics.

The intent of this research isn't to define what is "good" or "bad", "acceptable" or "unacceptable," but rather to establish the framework to examine the potential effects of the messages contained within photocopy humor. Further, the content of the photocopy humor examples collected and used in this paper does not reflect the beliefs, values or attitudes of the author. The collection of examples are an attempt to reflect what is being circulated.

Overview

Recently in the U.S., there has been a tendency to become more sensitive to ethnic and sexually based humor. Many of the nation's general interest publications (*Newsweek, Time, USA Today*) as well as leading women's publications (*Glamour, Mademoiselle*) have reported on various aspects of ethnic humor, both pro and con.

The attitude toward ethnic and sexual humor, a mainstay of content for photocopy humor, runs the gamut from crude, demeaning, hateful, juvenile, vicious, mean spirited, to harmless, funny, good-natured, exaggerations of life. A prevailing attitude in the literature suggests that those who can't find it within themselves to laugh are too uptight, too sensitive and can't take a joke.

Clark McCauley is one who believes that there's nothing funny about sexist humor. "Humor is particularly devastating because the hostility is disguised (Glamour, August, 1988). Susan Schneider, editor of *Lilith* magazine, commenting on Jewish-American Princess jokes stated, "It's become a socially acceptable outlet for anti-Semitic feelings" (Bruning, 1987).

On the other side of the argument, others embrace ethnic jokes. "...I think that's (a reference to Jewish joke) pretty funny. And I'm sorry, I just can't find enough high-mindedness within me to wish that this sort of joke didn't exist." (New Republic, 1987) In fact in the same article printed an etiquette guideline for telling ethnic jokes (New Republic, 1987).

One author felt we worried too much over things that aren't really important. "Much of the yelping at the media seems deeply trivial. A New York coven of witches complained when ABC televised *Rosemary's Baby*...and UFO enthusiasts groused when a woman was raped by a space alien on *Fernwood 2 Night*. Their point was that aliens do not go around raping people, and indeed there is little evidence that they do" (Lee, 1984).

Ethnic humor which was addressed in these publications focused more on the verbal joke format. Nothing has been written about photocopy humor. Ethnic and sexual humor could be thought of as a subset or specific type of photocopy humor thereby drawing upon the body of research which exists. The problem with lumping photocopy humor into the same category as verbal jokes is the longevity of the medium and the impact of the visual. A verbal joke, unless captured on recording devise, is absorbed into the ether—or locked away in the recesses of someone's mind. However with photocopy humor, there is a permanent visual record of its existence. Robert Heinich, et. al. stated that people are visually oriented and that they "...learn about 10 percent from listening, but over 80 percent from what they see (Heinich, et. al, 1989)." This statistic isn't surprising to teachers who design lectures, but given the context of photocopy humor and the content of such, the implications are alarming. Individuals could be "learning" stereotypes quite effectively from viewing photocopy humor.

In addition to sexual and ethnic based content, photocopy humor also lampoons old age. Images of befuddled and forgetful elderly are depicted. Older males are presented as sexually impotent and females are represented as having sagging body parts. Nationally, more and more groups are protesting the portrayal of elder Americans in the media. Frito-Lay has come under fire for a 1993 advertisement which shows comedian Chevy Chase rescuing a bag of Doritos from a elderly lady just before she gets steam-rolled under (Peoria Journal Star, October 6, 1993).

A greater understanding of how individuals perceive a message and what effect that message has on the viewer can be gained through the study of photocopy humor. This paper will examine photocopy humor in the context of social learning theory, cognitive dissonance theory and mass communication theory. The application of this research is of importance to parents, educators, administrators and instructional technologists. Photocopy humor is prevalent in today's society and could be used as a microcosm of human communication patterns. Additionally, the majority of the message is communicated through the use of visuals and could have implications reaching into the visual communication /visual literacy disciplines. Although photocopy humor is an informal communication pattern, similar elements (exaggerated drawings and characters) are used to communicate messages in textbooks, filmstrips, posters and displays. By examining this specific area of communication (primarily visual) one can draw inferences and generalities to other areas of communication (primarily visual). In essence, a model is created which can be used to apply theories to other areas of communication, both formal and informal, intentionally and unintentionally educational.

It is important to do a textual analysis of a representative sampling of photocopy humor to identify what types of messages are being sent. The message needs to be analyzed and categorized prior to any application of theories. Additionally, the basic assumptions made need to be detailed and validated. Further sampling of photocopy humor needs to be done and documented as to origin of collection, i.e., work environment (factory, professional, etc.) and demographic data (social-economic group, age, race).

The implications of photocopy humor are great in relationship to how individuals are value programmed to relate to another race or sex. Additionally, an individual's self-worth can be negatively impacted. The theory of self-fulfilling prophecy and Bandura's self-efficacy theory suggests the message could be impacting on the consumer. Both theories basically state similar principles of self-worth. Self-fulfilling prophecy states we will become or live up to others' reinforced expectations of us. Self-efficacy is what we believe to be true about ourselves and our capabilities to perform or achieve. Both theories have positive and negative implications. For example if a teacher continually told a student that he/she was dumb, eventually that student would believe this to be true and would stop trying to better his or her self. In this example the student would be "living up to" the expectation of the teacher. Further this student would have a low self-efficacy. Conversely, if a teacher or parent positively reinforced a child's behavior and told the child that he/she will be successful and could learn, the student would have a positive self-efficacy and would tend to fulfill that expectation.

The need for research has been established above which relates to and underpins the developing study of photocopy humor. What follows is an outline of the framework for the intended research.

A framework and problem definition for future research can easily be postulated to answer the following questions: Is photocopy humor a mass communication channel? What is the content of photocopy humor and how can it be classified? What are the social ramifications of the content (i.e., are viewers "learning" social/cultural biases from content?"). What effect does photocopy humor have on viewers?

Hypothesis one: Photocopy humor is a mass communication medium, bearing all the necessary principles and components of a mass communication medium.

Sub hypothesis: Photocopy humor extends to all social-economic and racial classes.

Hypothesis two: Social and cultural biases are learned and reinforced through the repeated exposure to the content of photocopy humor.

Assumptions about photocopy humor:

1. Photocopy humor is a mass-medium, therefore mass communication theories are appropriate to apply to photocopy humor.

2. Social Cognitive Theory is valid and applicable to photocopy humor.

3. Cognitive consistency theories, specifically Festinger's Cognitive Dissonance theory is applicable.

Overview of Collection

A sample of 355 examples of photocopy humor was coded by trained coders based on iconography and/or textual information. Preliminary work with coders resulted in the following breakout of the limited sample. The number one category for the number of items was sexual—general with 52 items. This category contained items of a sexual nature that could not be identified with one sex or the other. The combined total for all of the sexual categories was 97; over 32 percent of the total items collected were about sex or sexual topics. The number two category which was workplace—general which had 45 items for almost 13 percent. Ethnic examples numbered 33 items accounting for 11 percent.

The content of photocopy humor is dominated by ethnic and sexual humor and therefore it will be examined first. Nothing has been written specifically about photocopy humor, however generalizations can be drawn from research conducted about both ethnic and sexual humor and applied to photocopy humor. Additionally research conducted concerning stereotyping will be included.

It is interesting to note how the photocopy humor reflects the events of the time in which the item was created. For example, all items in the political categories reflect in subject matter what was occurring politically. There are crude, sexually explicit drawings representing the presidential race between George Bush and Michael DuKakis. Iraq and Desert Storm are represented **(Exhibit4)**, likewise specimens from the Iran Hostage ordeal. Although the coders placed the later two items into political categories, the messages contained stereotypical traits of Iraqis and Iranians.

A drawback to the coding process is the age of the coders. College age students were used, therefore their placement of materials into categories reflects their generational view. The coding process needs to be re-done with a diverse population demographically to enhance coder reliability and validity.

DISCUSSION OF ASSUMPTION 1

Mass Communication Theory

It was earlier stated that photocopy humor is a form of mass communication, which is defined as a message communicated through a mass medium to a large audience. It is necessary to identify the characteristics which indeed make that statement true. There are four elements needed for a mass communication medium to exist: a mass medium technology, a message, an audience and a distribution network. First, the technology for this medium has been updated through the years and has progressed in sophistication. The wire copy machines of old and the facsimile machine and photocopiers of late serve as our medium for this mass communication endeavor. Second, there needs to be a message to communicate. The line drawings and textual information are what people want to communicate to others, therefore a message. Third, it is distributed to a large audience. Fourth, the distribution network is compiled of humans—those individuals who use the available technology to copy and distribute the information.

With the basic criteria to define a mass media met, an examination into the other shared commonalties of mass communication follows. Generally speaking, we can identify several characteristics of the process using the various mass communication models available. Many of the common elements found in the models include items such as regulators, audiences, effects, filters and noise. An examination of the HUB communication model will be used as an example of a testing mechanism for photocopy humor as a mass medium.

HUB Model of Mass Communication

The HUB Model of Mass Communication (Hiebert, Ungurait, Bohn, 1988) contains the following elements: Communicators, Codes, Gatekeepers, Mass Media, Regulators, Filters, Audiences and Effects. This model will be used to discuss photocopy humor as it relates to the various components.

Audience

The audience or receivers of the information were selected carefully by those who perpetuate the message. Because of biases, conflicts, perceptions and so forth, senders tend to share the message with only those who they feel would be receptive to the message. Senders learn who "is" and who "isn't" receptive and use that interpretation for future distribution. So in a sense, this is a very interpersonal mass medium. Just as people select what they communicate to whom, in an interpersonal communication context, the same is true of photocopy humor. Further, senders aren't physically and emotionally detached from the receivers which is generally true of traditional mass media.

Younger audience members are still developing their value system and can be influenced by photocopy humor's content. They are deciding what they will accept or reject as a part of their value system. The individuals are being impacted by the various media in many ways of which they, the consumers, are unaware. Examples will follow to support this assertion.

Effects

The effects of the medium can be viewed in terms of the impact on society and the impact on the individual (Hiebert, Ungurait, Bohn, 1988). The impact on society and individuals is an area which needs to be examined further, as the examples show a correlation between content and attitudes. The controversial content may tend to perpetuate stereotypes and misperceptions. The impact on individuals is more identifiable on the surface, in that the reaction of the receiver can generally be determined through nonverbal as well as verbal feedback. But underlying messages may be imbedded in the "harmless fun" and cause undesirable effects in the audience. Specific examples follow which will show how both individual as well as societal changes result from viewing photocopy humor.

Stereotypes

At the heart of photocopy humor is stereotyping. A great deal of the content appeals to the lowest common denominator and must do so in order for the audience to find the content humorous. In order for one to process the importance of analyzing the meaning of humor, it is necessary to examine how jokes work, theoretically. Therefore a quick overview of Victor Raskin's Script-based Semantic Theory (1985) is necessary. Basically a script is a collection of words, usually a sentence, which forms meaning in the minds of the receiver based on the combined meaning of the words.

Audiences of jokes assign certain meaning to scripts. Most humor contains two or three scripts. The first script sets up a premise and the last script (either the second or third depending on the humor), often called the punch line, switches the listener to a different, conflicting or contradicting premise. However, the scripts must be in the person's frame of reference or they must be quick learners to identify the implied connection for the joke to be humorous. When some people "don't get the joke," it is because the script isn't in their frame of reference and they cannot make the implied connection.

The following is an example of how scripting occurs using a joke from Rodney Dangerfield:

Script 1

I just flew in from Vegas.

This script typically leads the audience to analyze each word and assign meaning. Most would assume figuratively that *flew* = airplane.

Script 2

Boy are my arms tired.

This script contradicts the first in a literal sense in that *I* = flew, and thereby creating the humor. In analyzing scripts that deal with sexual or ethnic humor one would quickly see the humor often is created by playing off of a stereotype.

Script 1

How do you tickle a Jewish American Princess?

This script gives the audience a framework for analyzing the question, i.e.., an ethnic group. After assigning meaning to each word, the audience determines the key element is tickle.

Script 2

Gucci, Gucci, goo!

This script has a different meaning inherent in the play on words. Oftentimes when one tickles another, the act is accompanied by goochy goochy, goo. This is probably in everyone's frame of reference. But by using the word Gucci, a well-known fashion designer, there is an added or implied meaning. To extrapolate the implied meaning in the second script, one needs to examine the first script again to find the implied connection. When examining the first script, the only connection can be with a Jewish

American Princess. Thus, the stereotyped image of a rich individual is perpetuated. For the joke to be humorous, one needs to make the connection of script 2 and the stereotype. Therefore the stereotyped image either is in the person's frame of reference (previously learned) or is taught through the joke (vicariously learned). Once a stereotype is learned it is difficult to unlearn. A continual perpetuation of an image has begun.

A recent study conducted by the National Opinion Research Center found stereotypes die hard (Newsweek, 1991).

> [The survey found]... that three quarters of the respondents say blacks are more likely than whites to "prefer to live off welfare." A majority believes that blacks are more likely to be lazy, violence prone, less intelligent and less patriotic. ...The most surprising revelation is the degree to which negative stereotypes of minorities cross color lines. Surveyors reported that roughly a third of blacks and Hispanics rated their group below whites in intelligence.

Is the media to blame for the continued stereotyping and negative self-fulfilling prophecy of minorities? Examination of the following examples tends to support a causal relationship.

A recent trend in ethnic and photocopy humor is JAP jokes or Jewish-American Princess jokes. At the heart of JAP jokes is the stereotype that Jewish women are rich, clothes horses and mall-hoppers. They are sexually repressed, ill-tempered and need high-maintenance. Most have had a nose-job and are a daddy's girls. Cindi Leive, a younger Jewish lady became leery of herself becoming the stereotype. "For a while, I dressed down, wore less makeup; I didn't believe in the stereotype, but I didn't much want to *be* it, either (1992)." She correlated the rise in anti-Semitic feelings to the popularity of JAP jokes. Further she states "...the JAP caricature actually shapes the way we see Jewish women, encouraging us to notice materialism on Long Island, but not in Kennebunkport; to hear "me first" whininess in a New York accent sooner than in a southern drawl (Leive, 1992)."

Leive has indeed pointed out the latent effects area of the media including photocopy humor. Viewers are unconscious and unaware of the shaping of their beliefs, values and attitudes through the viewing of photocopy humor. A great deal of vicarious or incidental learning occurs when viewing photocopy humor. Viewers learn how to relate to themselves (even enough to modify behavior, such as the example above), how to relate to people of the same race/gender and how to interact with the opposite sex, and/or individuals who are "different" in some way from themselves.

A different ethnic stereotype, Italian-American and "The Mafia" share commonalties with the JAP case scenario. Joseph Giordano, director of the American Jewish Committee's Center on Ethnicity, Behavior and Communication discussed the prevailing attitude about Italian Americans. The media has perpetuated stereotypes that Italian Americans are shady and part of the criminal element and have a Mafia connection. In surveying a group of psychotherapists he asked "...what they would like, dislike or fear in a relationship if they were to marry an Italian American. What they most feared was that their spouse would be prone to violence or 'connected' to crime in some way" (Giordano, 1987). To further illustrate the impact of viewing, thus strengthening the concept of "life imitates art" is the fact that media is supplying the real Mafia with a self-fulfilling stereotype. U.S. Attorney Rudolph Giuliani says there is a distinct difference in the wiretaps of Italian-American criminals before and after

The Godfather. Many, Giuliani says, began to sound like the characters in the film (Giordano, 1987).

Model-minority, scholastic overachievers, science-minded are all descriptors which have been used to describe Asian-American students. These stereotypes like the Mafia and JAP tend to be perpetuated by the media. Stereotyping has developed public attitudes of Asian-Americans as book-worm nerds and overachievers. Additionally, these stereotypes have served as a Locus of Control for many Asian-Americans driving them into and away from professions. David Shim scored a 1580 out of 1600 on his college boards but decided against a career in science. "'All my teachers were disappointed that I didn't go to M.I.T., ...but I really wanted to avoid the stereotype of the science geek'" (Allis, 1991).

The above examples support Massey's value programming model. What You Are is Where You Were When, when you were value programmed. The "how" of the equation would be the media, including photocopy humor. Based on the evidence above, viewing stereotypical material and roles which are presented in the media affect the way we view ourselves and the way we view others.

Content: General and Specific

Typically the content of photocopy humor is generally humorous in nature, serving as entertainment and/or as a social commentary. It is hypothesized that incidental learning and shaping is occurring, which would suggest that education is also occurring.

The collection of photocopy humor examined for this research was compiled from collections of several individuals who had kept many items in file folders for years as well as individual submissions. In one case, a person had been collecting photocopy humor items since 1974. This was a great find as a historical (yet biased) collection of examples.

As stated earlier, the entire collection examined included 355 items. Some items are duplicated in content, but differ in generation or heading. In examining these items, it was determined that there are two basic categories for which all belong. One is general or "generic" humor, while the second is much more specific in nature.

Most of the humor contained within the sampling is very general and broad in nature, that is, someone in California can appreciate the humor of the item just as much as someone in the rust belt. The subject matter is of the general type — something that has mass appeal. A good example would be many of the items dealing with a sexual topic **(Exhibit 1)**. Generic humor can transcend the boundaries of one organization or geographic locale. The humor doesn't have to be based in the receivers' frame of reference to be funny. Receivers can relate to the item without it being specific in nature to the receiver's world.

Although a small percentage of the collection is specific in nature to include a reference to a particular firm or organization (the item uses the name of an actual firm) **(Exhibit 2)**, or region of the country (town or state), the message of an item can usually carry itself without such a specific reference. The receivers may miss a portion of the intended message, but generally can relate the information to an area or firm in their frame of reference. For those in close proximity of the specific city or state, the item carries an additional message (right or

Exhibit 1

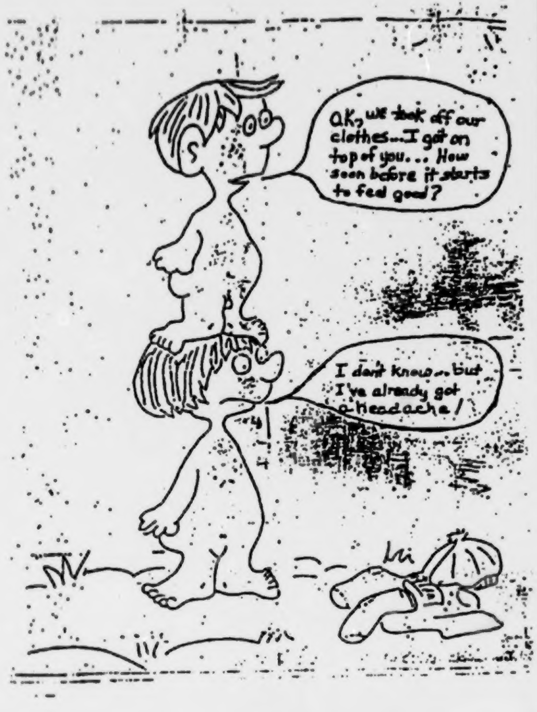
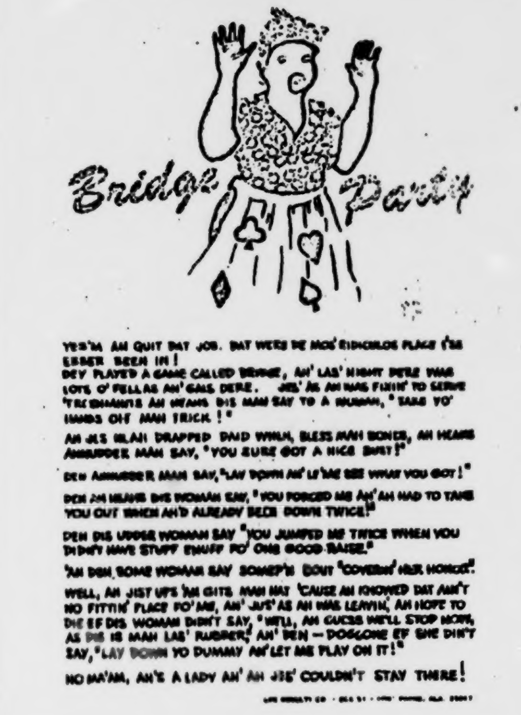

OK, we took off our clothes...I got on top of you... How soon before it starts to feel good?
I don't know...but I've already got a headache!

Exhibit 3



Bridge Party

YES'M AH QUIT DAT JOB. DAT WERE DE MOS' RIDICULOS PLACE I'SE EBBER BEEN IN!

DEY PLAYED A GAME CALLED BRIDGE, AN' LAS' NIGHT DERE WAS LOTS O' FELLAS AN' GALS DERE. JES' AS AH WAS FIXIN' TO SERVE 'FRESHMENTS AH HEARS DIS MAN SAY TO A WOMAN, "TAKE YO' HANDS OFF MAH TRICK!"

AN JES' DEN AH DRAPPED DAH TRAY, BLESS MAH BONES, AH HEARS ANUDDER MAN SAY, "YOU SURE GOT A NICE BUST!"

DEN ANNUDDER MAN SAY, "LAY DOWN AN' LE'ME SEE WHAT YOU GOT!"

DEN AH HEARS DIS WOMAN SAY, "YOU FORCED ME AN' AH HAD TO TAKE YOU OUT WHEN AH'D ALREADY BEEN DOWN TWICE!"

DEN DIS UDDER WOMAN SAY "YOU JUMPED ME TWICE WHEN YOU DIDN'T HAVE STUFF ENUFF FO' ONE GOOD RAISE."

AN DEN SOME WOMAN SAY SOMEP'N 'BOUT 'COVERIN' HER HONOR'.

WELL, AH JIST UPS 'AN GITS MAH HAT 'CAUSE AH KNOWED DAT AIN'T NO FITTIN' PLACE FO' ME, AN' JUS' AS AH WAS LEAVIN', AH HOPE TO DIE EF DIS WOMAN DIDN'T SAY, "WELL, AH GUESS WE'LL STOP NOW, AS DIS IS MAH LAS' RUBBER," AN' DEN — DOGGONE EF SHE DIN'T SAY, "LAY DOWN YO DUMMY AN' LET ME PLAY ON IT!"

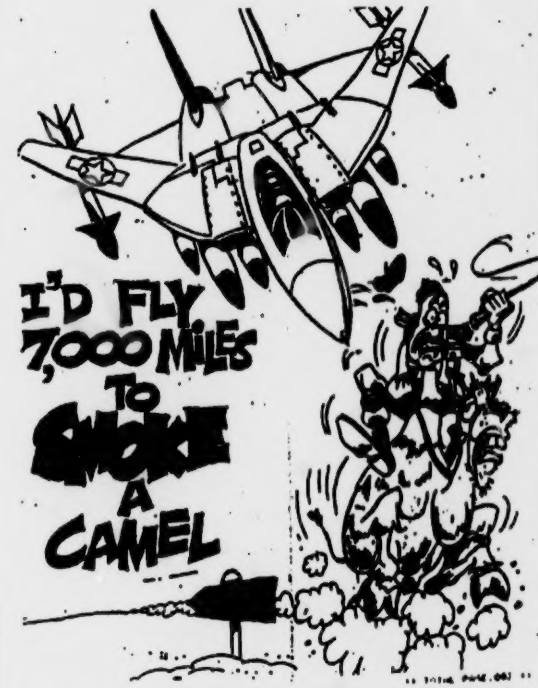
NO MA'AM, AH'S A LADY AN' AH JES' COULDN'T STAY THERE!

Exhibit 2

This is your Brain: CAT

This is your Brain on Drugs: UAW

Exhibit 4


I'D FLY 7,000 MILES TO SMOKE A CAMEL

BEST COPY AVAILABLE

wrongly). Those without a frame of reference for this particular city or state can find this humorous by substituting their own "city" into the equation and find the item humorous. The exception is **Exhibit 2**, of which many receivers may not "get" the humor. This example is a recently created item which reflects someone's thoughts about the labor problems at Caterpillar. More than likely, it was created during the strike period of 1992. It is clear that it was recently created by the use of Caterpillar's new logo. It could be a take-off on an old idea or theme and was re-created, recycled or updated. This is not uncommon as will be discussed later.

In most of these cases, specific content items were at some point general in nature and later adapted to the specific. Some items collected are the same content-wise with the only difference being one makes reference to a specific firm. This indicates the item was adapted by someone to include a reference to the specific, or an attempt to localize the humor. A good example of this is an "exam" which had a cover page stating it was an exam for political science department. The cover page was printed on official Bradley University stationery.

Another sample was found with the cover page changed to identify it as a Polish "IQ" test, but what followed was the same exam as the political science exam. Whether this change was an attempt to localize the humor or an effort to be sensitive to a nationality or a combination of both is unknown.

Noise/Filters

Noise is inherent in all forms of communication from intrapersonal to interpersonal to mass communication. Noise is an interference in the reception of the message which could take one of three forms: physical noise or real noise in the channel, psychological noise (including filters)—meaning and interpretation of the message differs from sender to receiver, and physiological noise which is noise that results from a bodily state. All three forms of noise would interfere with the fidelity of the message, however physical and psychological noise would be the dominant sources of noise concerning the reception of the message from photocopy humor.

The quality of the copy is an example of physical or real noise. As the quality of the copy lessens, noise is introduced into the channel. This noise is exponentially tied to quality. A very good, sharply printed clear item would have a very low noise level.

Generally speaking, photocopy humor varies in reproduction quality from very good to very poor. Many of the later generations of a copy show the quality loss (or physical noise) in drop out of words, copier tracks (lines and specks caused by foreign objects on the glass of the copier), lines caused by page edges, staple holes, improper settings on the copier (very dark or very light copies) and loss of a particular element of the whole document due to the limitations of either the machine on which the item was reproduced or the operator **(Exhibit 1)**.

It should be noted that several of the samples the author collected show a progression of sorts. Multiple copies of the same item have been collected and show that somewhere along the line, someone has received a poor quality copy and decided that the item deserves a "new" or "extended" life and has redrawn or retyped the item to the best of his/her ability. The redrafted item generally contains the essence of the original, but more or less detail is added. This would be an example of correcting for noise (poor copy quality).

Psychological noise deals with how accurate the message is interpreted, how much of the message content and intent is hampered by the perceiver. Predisposition to a particular subject matter may influence interpretation. Interpretation of the iconography also figures into the equation as a form of noise.

Regulators & Gatekeepers

Regulators and gatekeepers are those individuals who have the power to control the flow of information. In traditional mass communication, the regulators and gatekeepers have the power to block or inhibit the message from reaching the audiences. Regulators typically are external to the communication organization: the government, public pressure groups, affiliation, etc. It was previously mentioned it would be next to impossible to regulate photocopy humor because of the informality of the network. Regulators could be office rules prohibiting the use of company technology or prevent posting, but is limited. Gatekeepers are those individuals who are a part of the medium. An example is the editor or television producer who can stop a story or idea from being disseminated. This person is internal, therefore a gatekeeper.

Traditional mass media gatekeepers and regulators wield a great deal of power and influence. Yet in photocopy humor this simply isn't the case. Gatekeepers can choose to pass a copy of photocopy humor on or to let the message die with them but they cannot stop the entire flow of information as the distribution network is too large. Even if several gatekeepers stop the flow of information, the chances are improbable that the message will end. The medium is too large and complex for that to happen. The worse case scenario is a portion of the audience will lose out on that specific message. Gatekeepers can alter or edit the message as they see fit.

Several items in the collection are the same with the exception of who was the focus of the humor. I have a "letter" a Polish mother wrote to her son which is identical to a Kentucky mother's letter as well as a Arkansas mother's letter. The same is true of items dealing with sports teams. In the redraft stage, someone decided to localize the humor, thus taking the general to the specific.

The content of the photocopy humor dictates with whom the item is shared and how it is distributed. By the very nature of photocopy humor, that is, humor which often appeals to the lowest common denominator, much of the subject matter draws upon stereotypes. It is unlikely that a person of one race will distribute to a person of a different race an item which pokes fun at that individual's race. Additionally, individuals of race may serve as gatekeepers and stop the flow of information or alter the content of an item which contains a reference to a race.

There are many other classifications that would limit the distribution, race is just one example. The participants involved in the communication narrow the scope of distribution based on the content of the item.

DISTRIBUTION

Distribution includes the technology used to transmit the message. The primary distribution technology used today is the plain paper copier. Facsimile machines do figure into the mix, but is still a minor part. Based on the collection gathered, the distribution technologies have included handwritten, typed, carbon paper copies, mimeographed, computer and thermo copies. The first three items were all phraseology jokes, no visuals. The later three included visuals. The quality of the thermo copies was very poor to the point of being unreadable because they tend to fade over time.

Photocopiers

Photocopiers tend to be and will continue to remain the primary distribution technology for the following reasons. First, the price of the machine and cost per copy makes the technology attractive to use. Personal copiers can be purchased for under $500.00. The cost per copy is still only .05 - .10 cents a copy.

Second, photocopiers can be found virtually anywhere. In small town grocery and drug stores to large self-serve copy giants like Kinkos. The drop in price for a machine can be an attributing factor to the market penetration.

Third, many copier machines are located in areas which allow for self-operation. Users would not be intimidated by going through a service bureau to copy something that may be embarrassing or scrutinized. Again, price of the machine has attributed to this. Additionally, one doesn't need to rely on the copier at work to make their copies. However, this statement shouldn't be interpreted that people do not use office equipment, because they do.

Forth, because of the penetration, more individuals are familiar with the operation of the machine and the copiers have become more user-friendly as the technology improves. Thus more are apt to use a self-serve machine.

Facsimile

The use of a facsimile machine to transmit the message is just another step in the progression of the medium. The number of examples of photocopy humor increasingly has fax tracks on the edges. These fax tracks are the transmit terminal ID (TTI) printout which appears at the top of each page. TTI includes the name of the business, the business telephone and number of pages sent.

These fax tracks become a part of the message as it is photocopied and further distributed. A lineage, although limited, can be established. The fact that lineage can be proven and known by countless thousands might preclude the use of the fax machine as a distribution technology.

Currently many of the fax machines are located in places of business. Further, they are generally not available for self-serve, open access use by individuals. Many are within steps of a self-serve photocopier, however, fax machines do not enjoy such market penetration yet. Secretarial pools and/or support staff personnel are generally the individuals who send, receive and distribute faxes. This lack of free access limits the use (abuse?) of fax machines in distributing photocopy humor. Secretaries and such serve as an unknowing gatekeeper of information.

Given the above two examples: fax tracks and limited access to self-serve fax machines, the photocopier will continue to dominate as the primary distribution device until the market is saturated with fax machines which are readily available for individual self-serve use.

Computer Printers

Computer printers do play a part in distribution, but based on the collection, they only contribute slightly. The cost per copy off a laser, ribbon or ink jet printer prohibit large scale reproduction. Where computers and printers do figure into photocopy humor is in the updating or redrawing stage of the process. Individuals may "whip out" a fresh version off of the computer and printer, but use a photocopier for the volume copying.

The cost of a computer and printer would prohibit participation by some. The complexity of computer technology might also hamper the use by older or less educated individuals who haven't been exposed to technology.

Computer Bulletin Boards

Computer Bulletin Boards and online access provides yet another channel for distribution of similar material. I intentionally excluded bulletin boards from the study for the following reasons. One, the study is limited to include only those items of a "hard copy" nature (paper). Second, bulletin boards access is limited because of the specialized knowledge, necessity of equipment and on-line charges. On-line computer bulletin boards might exclude individuals of certain socio-economic and educational levels from participating because of the costs necessary for hardware, software and continued usage fees. By including an area which limits participation, this would skew the results and not accurately reflect what is.

CREATORS

One can't help but wonder who is responsible for the original creation of the piece which eventually becomes a well traveled example of photocopy humor. One could speculate that the makers of photocopy machines employ a staff of creative thinkers to generate new items, and thus create a need for the copier. Or perhaps it is the makers of the supplies for the copiers, or the paper industry.

In reality, not enough is known about the creators of this very specialized form of mass media. When considering mass media, we generally know, for example, when Twentieth Century Fox produces a movie or when ABC produces the evening news. The producers have good reason to claim ownership—as most of the mass media is distributed for a purpose, there is a motivation behind the production. Oftentimes that motivation is profit. This is not generally true of photocopy humor however. The creator or distributor is not normally identified.

The studied collection of photocopy humor does contain several samples which have a company name as the producer. It is unknown if the company is a originator or an adapter of an existing item. Many of the businesses are in the duplication business and they are using this mass medium for advertising purposes. It is uncertain in what business the others are engaged. Regardless of business, advertising appears to be the motive. If the message is cleaver enough that other's would want to make a copy, a modest investment in copies could parlay into a widely distributed message. This would be a pyramid approach to advertising. Make and distribute 100 copies. If the 100 copies cost .05, then the total cost would be 5.00. If each of those copies were copied by ten people that would be 1000 copies. And if each of the individuals who received a copy made ten copies, the total number would be 11,100 copies for the price of the 100 copies, or a CPM of .45 cents to the advertiser.

The downside to pyramid advertising would be the judgment of advertisement placement, the loss of control and the fidelity of the message. One could question the judgment of the business who would choose to advertise their business on a medium which carries controversial material **(Exhibit 3)**. Additionally, as previously discussed, many individuals along the way can alter a portion of the message which still bears the name of a company. If the message wasn't controversial at the beginning, it might be changed.

Summary Assumption 1

It can be concluded by examining and placing elements of photocopy humor into the various categories of a mass medium model that photocopy humor is indeed a mass medium. The implications of the above research should dictate that more information is needed on the subject of photocopy humor. Inferences are drawn based on the visual and textual data presented. Based on previous experiences and closure of surrounding data, the message is decoded.

DISCUSSION OF ASSUMPTION 2

Social Cognitive Theory

Social cognitive learning theory postulates the idea that learning occurs in a social environment. Through "...observing others, people acquire, rules, skills, strategies, beliefs, and attitudes" (Schunk, 1991). Albert Bandura's work has been instrumental in formulating social cognitive theory. His research has established a framework for studying media effect and vicarious learning. Vicarious learning, he states, is responsible for much of human learning. Through the observation of models, either live, recorded or read we develop and acquire skills and behaviors upon which we can draw (Bandura, 1986).

It is important to examine the possible effects that vicarious learning has on consumers of photocopy humor. With the latent messages and stereotypes imbedded into the text, one can only assume that individuals will vicariously learn from the "hidden messages." As they encounter more and more, their value system will be modified. Humor serves as the reward, thus they will seek out additional items. Gradually a schema for relating to society is developed without much real thought by the individual. Quite vicariously, a value system has been established. This value system is going to be called upon as a social framework when encountering individuals who are different.

Williams, Zabrack and Joy developed a schema theory (1982) which builds off of Bandura's vicarious learning theory and ties directly into the idea of vicarious value system building. The schema theory is a model which accounts for how individuals build and modify information. Individuals add or modify their belief about social reality through observing others, television and direct experiences. This schema-based concept has also been used to explain the acquisition of stereotypes. We are socialized through media. This socialization process is what we draw upon when faced with similar events in our own lives.

In this world, most really do not want to be biased or prejudice. We recognize the detriment prejudice plays in society. Yet, when encountering a situation of involving individuals we have stereotyped, we recall those prior experiences and we draw upon our repertoire of responses, our value system and the stereotype is there—deeply rooted. Devine, et al. stated that "Overcoming a lifetime of socialization experiences that, unfortunately, promote prejudice is an arduous task"(Devine, 1989, 1991; Dovidio & Gaertner, in press; Ehrlich, 1973;

P.A. Katz, 1976). Individuals may "...renounce prejudice (or) may continue to experience prejudice-like thoughts or feelings" (Devine, p. 817). This coexistence of conflicting beliefs can lead to cognitive dissonance in the individual. The inner conflict of beliefs can lead to guilty feelings for thinking or reacting in a certain fashion. Many authors indicated feeling guilty after laughing at or finding ethnic humor funny. This conflict could possibly be the reasoning behind the guilt feelings. This inner conflict is the heart of Festinger's Cognitive Dissonance Theory. Simply stated, the more items a person knows that are inconsistent with the expressed behavior, the more dissonance the individual will feel. Thus when faced with humor which plays off the concept that blacks are lazy or JAP's are sexually repressed, we have a knowledge base which makes us realize these are not true attributes of that segment of the population. Yet, a separate part draws upon the ingrained value system, the prejudice and stereotypes and hence the conflict.

DISCUSSION OF ASSUMPTION 3

Cognitive Dissonance

As mentioned above, consumers of ethnic humor sometimes feel guilty for finding the item humorous, while others feel uncomfortable listening to ethnic or sexual humor. These feelings are reactions to the inner conflict in the value system they have developed. This uncomfortable feeling of conflict can vary in degrees of conflict. The more incongruent the values, the more dissonance one feels. The incongruency of values result in a drive to reduce the dissonance.

Festinger's theory provides a conceptual framework to examine the guilt feelings associated with viewing and finding the content of photocopy humor humorous.

Implications for Educational Practice

The ability to control exposure to mass media by children and young adults varies in success depending on the type of medium. It is very difficult to screen all stimulus inputs to which the youth are exposed. With this statement as a given, much effort is needed in the homes and in the schools to educate students to become critical viewers and consumers of media. Teaching critical viewing skills is slowly becoming integrated in classrooms. Unfortunately, critical viewing skills become yet another subject area in an already crowded arena of increased educational demands placed on the schools. And all too often such coursework is at the university level, much too late. Values and beliefs are well established and difficult to break. As educators and parents, we need to be proactive rather than reactive in examining the material that constantly bombards the populous.

Giordano also suggests a proactive approach. His suggestions deal with fighting the "Mafia" stereotype, but are applicable to all stereotypes. In summary, he suggests: 1. divert resources from battling stereotypes to promoting positive images, 2. challenge those who use negative ethnic stereotypes, 3. call for accurate portrayal in all mediums, 4. and finally, rise above the stereotype and serve as role models.

FUTURE RESEARCH

Simply stated there aren't answers to the questions raised. A great deal of research is indicated based on the possibility of negative effects. The research and data base so far points to the need for additional inquiry into photocopy humor.

Photocopy humor's message tends be visually oriented which accounts for the majority of meaning of the messages. Audiences are primed for visualness of the messages through years of socialization with the primary visual medium, television.

Additionally, surveys could be developed which would identify who the creators are and what purpose they intended when they created the photocopy humor item. The survey could also determine the demographic make-up of the audience members.

It is important to do further textual analysis to validate the preliminary findings as to specific content. A wider sampling is necessary. Care needs to be taken in not only the coding of the content (as mentioned earlier) but also in documenting the source of the sample for accurate and representative validity. The specific source is not important, but the occupation is. Photocopy humor transcends social-economic and racial classes. Samples from each class is necessary to accurately portray "what is".

SUMMARY

Thus far, the implications of some of the research indicate that education is the key to debunk myths and stereotypes which are common commodities in photocopy humor. This author recommends that teachers and parents need to 1. teach critical viewing skills, 2. turn attention to proactive measures rather than reactionary behaviors, 3. recognize the significance of seemingly trivial stimuli 4. and finally, teach tolerance.

No one source of value programming can bear the responsibility of perpetuating stereotypes. All the experiences one engages in and are exposed to has an impact on the development of beliefs, values and attitudes. Family, friends, schools, religion, media and so forth all share a part in the shaping of beliefs, values and attitudes. We need to become aware of the our own value programming and recognize the validity of our feelings. We can change our behaviors, but the process is slow and arduous.

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Merging Art and Technology: Computer Mediated Teaching

Rhonda S. Robinson
Linda Manlove

For the past several years, the I.V.L.A. Conference has included presentations on the teaching of Visual Literacy concepts and skills. (See the *Readings,* 1991,1990.) Several teachers and scholars have shared their ideas and practices in the teaching of visual literacy to both undergraduates and graduates students. Their syllabi have included readings, "sense walks", personal symbols, film analysis, and critical television viewing activities. Many media samples have been shared, especially the creation of video and film production. Anyone starting to teach visual literacy could benefit from the information shared in these symposia.

This presentation is a continuation of that sharing of teaching ideas. The paper/demonstration and handouts are designed to encourage instructors to add computer mediated lecture/discussion and visual databases to their instructional repertoire. We believe this method helps provide students learning the concepts and vocabulary of visual literacy visual examples from a variety of sources.

This paper summarizes the presentation and gives some details of the technology, the software, and the design activities which we have used to create our first mediated presentations for the Visual Literacy class taught at Northern Illinois University to graduate students in the Instructional Technology program.

In the past, we have introduced the language of visuals by using a slide/tape produced by the Center for Huymanities called *Learning to See and Understand* (1973). Vocabulary exemplified in the slide/tape includes these terms: color, shape, line, light, texture, pattern, perspective, point of view and angle, size framing, motion, sequence, juxtaposition. Often, we have students practice the identification of these terms through the examination of print ads and photography, through magazines and posters. An additional method of exemplifying and practicing these terms is using a visual data base and a computer aided lecture/discussion. With a large number of visuals available, and an organized lecture/discussion, students are given the opportunity to practice the terms and see them illustrated several times, until their questions are resolved.

We have also used this method to present the ideas and visual renderings of the book *Picture This,* by Molly Bang (1991). Using the bold drawings and shapes from the book, students are lead through the concepts of the book, and can experience them together as a class. The ideas are reinforced and their readings and understanding of the ideas is a shared activity.

A third lesson developed into a computer mediated lecture/discussion is one of the exercises in visual literacy and visual problem solving. Again the exercise presented in this manner allows the whole class to participate and practice problem solving.

Visual literacy materials and teaching techniques have been developed using the more traditional media of film, photography, television or video. This course has expanded to introduce the computer as both a presentation tool and a reinforcer of new ideas. The next step will be to have students add to the visual data base themselves by locating frames on videodisc, scanning materials or video digitizing images for the collection. The students feel certain that they can add to the instruction and practice their skills at the same time through such an activity. In time, they will be able to plan and execute their own class presentation using the data base materials and the format we've modeled.

In this way, we will be adding another encoding requirement to a course that has previously been primarily a "decoding" experience. The definition of visual literacy includes both the encoding and the decoding of visual communications, and we feel confident that the new practice and performance requirement of the instructor and the students will benefit everyone and raise their own levels of expertise in becoming more visually literate. Essentially we have reviewed what we are doing in the realm of visual literacy instruction. Now we will provide some of the how we are doing this.

The visual literacy curriculum is a fluid dynamic curriculum, adapting itself to be an integrated skill that, like reading, crosses curriculum lines. Visual literacy is, of course, best taught by visual examples, yet because of the fluid and expansive nature of visual literacy, examples are difficult to organize and maintain:

- visuals become mixed up
- one example is rarely enough
- students may have limited access to visual examples

The basic ingredient for computer support of teaching visual literacy integrated throughout the curriculum is a visual data base of visual examples.

By using object oriented programs, such as LinkWay, Toolbook and Hypercard, we can create control programs to organize and display examples. Such programs offer the perfect vehicle for organizing and presenting our visual examples. Information frames are created with action buttons to display the desired examples. These action buttons simply direct the program to display the requested visual from any of the available sources.

Conceptually the process is very straightforward. Visual examples are stored in some electronic format. Computer programs are developed to allow access and control of presentation of these visuals.

Three obvious questions arise.

- Where does one get electronically stored visuals?
- Where does one get programs for accessing these visuals;?
- What is needed to display the visual as part of a course?

Sources of visuals for computer mediated delivery:

There are currently three basic types of electronic visuals. The first are those generated by the computer. These would include anything done from a paint package, an art program, computer aided drafting programs, and even scanned images. No longer second class graphics, computer generated graphics are now recognized as a powerful and professional media.

The second type of electronically stored visuals are digitized images. Digitizing requires a source, either an object or a visual. Digitizing is the process of...

The third type of electronically stored visuals are from video files or analog storage. Analog visuals are a true picture of the object. The analog image is still the clearest depiction of anything in the real world.

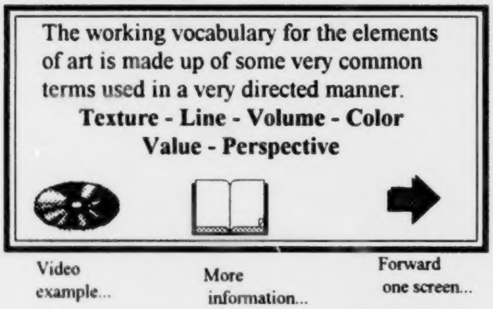
The size of electronic files defines how these images are stored and made available. Computer generated images can be stored on disk for transport and future access. The more complex the drawing is though the larger the file. Digitized images easily exceed the size of a disk so they are more frequently being offered as CD ROM collections and lastly the laser disk is used for video images.

Electronic Visuals:

Format	Storage
- computer generated	- disk based
- digitized	- cd rom
- analog	- laser video disk

The Control Program:

Sample of a program screen



The working vocabulary for the elements of art is made up of some very common terms used in a very directed manner.

Texture - Line - Volume - Color
Value - Perspective

As stated earlier, object oriented programs are easy to use and can easily be changed. Once information screens are constructed, action buttons are added (quite literally, pasted in from the program) to accomplish some task. Linkway Live comes with over 30 preprogrammed buttons ready to be applied. Templates allow teachers or students to enter their own actions and tie in their own examples.

Equipment Necessary:

MS DOS:

- 386 or faster machine (although delivery can be from slower machines, it is often a long wait for complex graphics.)
- VGA or better graphics
- VGA card with one meg. of ram on the card (this aids in the display time).
- Adequate disk storage (100 mg or better)
- Television receiver for video generated graphics
- LCD screen to project the visuals from the computer

Software

MS DOS:	Mac:
LinkWay Live	HyperCard
Toolbook	

Why Bother:
Visual Databases in Teaching:

- To learn students must practice. They must be guided through the simplest task to more complex tasks. By setting up visual databases and control programs we can gear our examples to the working level of our students. We can also offer more examples when it seems appropriate.

Example: When first learning the working vocabulary of visual literacy, simple scanned line drawings offer solid examples. As the students progress and become more comfortable with the vocabulary, more complex drawings are programmed into the action buttons.

- To learn students need to work with pertinent examples. Often the subject matter is so removed from the students, the struggle is not with the newly developing skill of using a visual vocabulary but in understanding the visual they are being asked to evaluate.

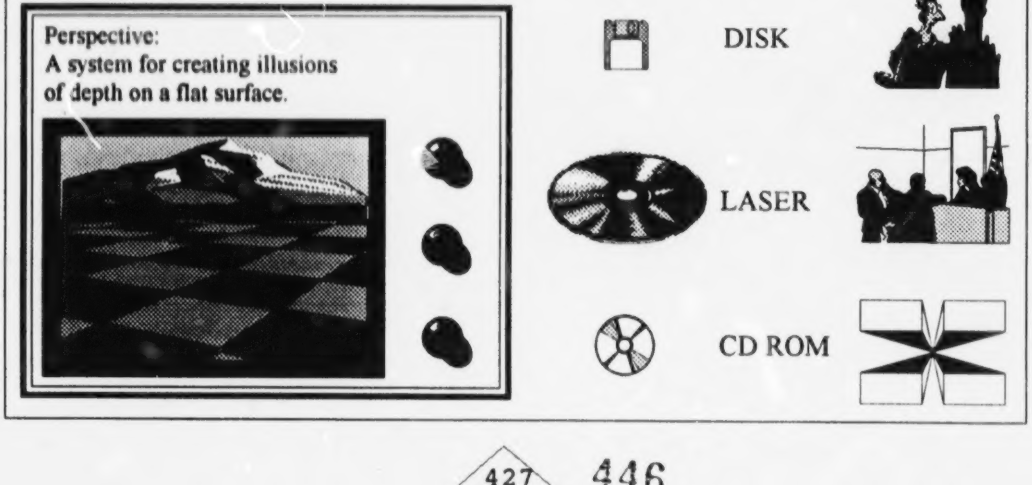
Example: Simple scanned drawings of automobiles offer some youngsters the interest level to use new vocabulary.

- To guide and teach we need to be efficient with our own time. Developing and incorporating a series of visuals for a standard lesson and integrating visual literacy into that lesson is being efficient both in the use of our time and the learning time.

Example: Locating, generating and selecting a series of visuals for a unit on the Civil War would result in a series of visual examples for much of visual literacy's language. Remember too, almost any projected visual can be used in the area of desk top publishing so the visual for the history lesson could be used for the visual literacy lesson and incorporated into written lesson materials.

We have presented the background to and processes of creating and using computer mediated lecture/discussion as a new teaching technique. With this introduction, one should be able to investigate and consider further uses of these ideas in teaching visual literacy or in preparing visuals for integration into many subject areas.

From program screen to source of the visual:



Perspective:
A system for creating illusions of depth on a flat surface.

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Visual Literacy Through the Visual Arts

Inez L. Ramsey

Introduction

Sinatra (1986) has explored the primary role of visual literacy in the development of other verbal, nonverbal and computer literacies through the interaction of three basic components - viewing, exploration, and nonverbal representation. His research provides a theoretical foundation for the infusion of the arts, including the visual arts, into the school curriculum. Sinatra (1986, p. 43) states:

> Educational practices must be widened to include a more enlightened process perspective embracing the arts and a readmittance of the basic nonverbal curriculum that was an early, essential part of youngster's lives. By so doing we will restore the components of visual literacy to an influential role in shaping creative thought.

With the current emphasis on integrated language arts curricula, educators from the various disciplines, including elementary classroom and art teachers, school library media specialists and computer literacy coordinators, should also be encouraged to address methods for developing elementary students' knowledge, understandings and appreciations of the visual arts in an integrated approach to curriculum development in the schools. Many elementary schools lack even basic visual arts instruction. These schools may have no art professional available or share the expertise of one art educator among schools. Instruction in the visual arts is frequently presented in isolation from the language arts curriculum since art periods are used to provide classroom teachers with planning time. As a result, visual arts instruction is not reinforced in other key areas of the curriculum.

Resources available in the schools to support a visual arts curriculum include a wide range of picture books. Lacy (1986) focused attention upon award winning picture books as a means of introducing children to the visual arts. Through picture books teachers, library media specialists, art teachers and parents can integrate literature in the curriculum while developing children's abilities to understand artistic design, art history and criticism. Lacy's analysis of the Caldecott Award books in use of artistic design elements provides a foundation for an integrated visual arts curriculum in the schools. Her work should be required reading for all elementary educators. Children's experiences with art in picture books provide many opportunities for discussion of a range of visual arts concepts.

The Arts Education Curriculum

Educators considering the development of an integrated visual arts curriculum should consider aspects of the art curriculum to be included such as art making, art history, aesthetics, art history and multicultural or global education. Children's picture books, works of art, and other selected art products should be available in the school library media center to support the integration of the visual arts in language arts, social studies, science and other curricular areas. The following studies are useful in addressing the scope and content of an integrated curriculum.

Clark (1991) reviewed three major art education curriculum orientations, including child-centered, society-centered, and subject-centered. His review is helpful in addressing the theoretical foundations in art education. The child-centered orientation emphasizes the the development of the child's abilities and capacity for self-expression in art. Society-centered orientation places emphasis on a community's needs for teaching children social values and addressing broad social problems such as environmental education and multicultural, multiethnic or global education. The subject-centered orientation to art education places emphasis on art making, aesthetics, art criticism and art history. He observed that these curriculum orientations co-exist in educational programs and are reflected in many art art textbooks.

Stanford (1990) in her discussion of discipline-based art education encourages elementary teachers to provide a curriculum which develops students' abilities to see visually and culturally. Her discussion includes utilizing a wide range of art work from a variety of modern and contemporary sources and in a variety of formats from quilts to Japanese prints. She notes, "Five-year olds can discern different kinds of lines, shapes, textures, sizes, two-or-three dimensionality et cetera and can tell you how they respond to them (1990, p. 18)."

Zimmerman (1990) reviewed the teaching of art from a global perspective as a means of developing understanding and appreciation of differences within cultures. She reviewed community-based art programs which integrated Afro-American history and art. Arts programs included speakers from different ethnic groups. Her study explored issues in developing a global perspective in art education.

Hagaman (1990) addressed aesthetics, or the philosophy of art, in the art curriculum. She advocates the discussion of art as a means of encouraging children to explain why they think as they do. For example, what criteria should be used to judge realism in a work of art if the child prefers realistic art work? Such discussion should focus on active listening and willingness to consider the opinions of others.

Cooperative Art Programs

Concerned educators and parents have addressed the need for cooperative efforts in providing elementary age students with art experiences integrated into language arts and library information skills curricula. Sinatra (1986) successfully employed visual communications in the language arts curriculum. His literature review also outlines successful applications of photography, including Polaroid's Education Project and Kodak's Cameras in the Curriculum Project.

Although working with gifted students from grades seven through nine, Darlington (1992) reported on a writing class which integrated a visual and verbal curriculum. She concluded, "Indeed, visual literacy could provide a basis for writing experiences"(1992, p. 192). Students participating in this summer program for gifted and talented discussed and analyzed art, developed artists' profiles and experienced quality literature as part of the writing process.

Kula (1989) and others developed examples of various teaching methods designed to aid Arizona educators in integrating visual arts lessons in an integrated curriculum. The authors provided sample art objectives and methods for achieving objectives through related themes in language arts, science, and other curricular areas. Discussion includes a planning model which utilizes three visual arts skills components: art in cultural heritage, aesthetic assessment and creative art expression. Their sample lesson plans include the use of picture books as springboards for art, reading, writing and research activities. Arizona State Department of Education's classroom teaching guides, published as *Arizona Visual Arts Skills* provides a curricular guide and activities for kindergarten through secondary school. The guide is a useful curriculum model in developing learning objectives. The State of California's (Lundin, 1989) guide to developing a framework for the visual and performing arts is also a useful tool in defining an arts curriculum.

Papke (1993) and others developed a Children's Art Network to support, promote and develop art enrichment opportunities in public schools which did not have visual arts programs. An art through the curriculum project provides teachers with integrated art activities, based upon children's picture books and other media, to achieve curricular objectives.

Epstein and Dauber (1989) reported the results of a three year project to provide middle school teachers with methods for developing a program integrating art and social studies. The project included parents in roles as volunteers to present lessons on well-known works of arts. The project linked art appreciation, history and criticism to the middle school curriculum. The authors concluded that an integrated approach to art education was useful in developing students' art awareness, when art education programs are not well developed.

Overby (1990) and others focused on the role of the arts in the early childhood curriculum. Educators interested in designing an integrated visual arts curriculum will find relevant discussion on child development, arts assessment and curriculum development presented at an early childhood conference on the creative arts. Attention is also given to model programs and multicultural/global program development.

The federally-funded Kansas Arts Resource Training System (1988) provided technical assistance and in-service training to educators, therapists and parents in integrating the arts into the curriculum for special education students. The plan provided for trained resource coordinators who provided technical assistance and training in the arts to participants. The final grant report provides information relevant to developing similar efforts in other school districts.

Picture Books in the Curriculum

Teachers now utilize a wide variety of children's picture books in the language arts curriculum. Outstanding picture books serve as vehicles for a variety of communications activities, including choral reading, writing, speaking, listening and viewing. Picture books can also provide a springboard for talking about artistic design and experimenting with different media in the classroom and library media center. Cooperative planning between the art teacher, classroom teachers and library media professionals can provide opportunities for reinforcing and extending experiences in the regular classroom and library media center.

Lacy (1986) provides discussion of themes, design elements, biographical information, and analysis of art works which teachers can apply in integrating visual materials in the language arts, social studies and science curricula. She asserts:

> The world can be a visual
> delight-and so can the works of
> art that mirror it. The visual
> arts can be a lifelong wonderment
> and source of pleasure, and one's
> ability to enjoy them is enhanced
> by an understanding of the
> artistic elements, including
> line, color, light and dark,
> shape, space, and texture and their
> effects on the audience
> (1986, p. 1).

Each artistic element has a vocabulary of its own. Take, for example, the vocabulary associated with color. We speak of colors as primary, secondary and tertiary colors. Color concepts include hues, shades and tints. Colors can be warm or cool. Color can be used to create shapes and textures. Colors serve as a means of communication, as in red light/green light. We use color concepts to describe feelings or emotions, such as we turn blue with cold. Adults and children can learn the language of color and other artistic elements through planned interactions with quality picture books.

Concepts: Example Brian Wildsmith's
The Rich Man and the
Shoe-maker.

Color:
1. uses color and space to define shape;
2. uses primary, secondary and tertiary colors; heavy use of reds, purples and pinks;
3. uses uneven applications of color to achieve texture;

Shape:
1. uses geometric shapes to create forms and patterns;

Style:
1. cubist; color and shape unify the work

An art teacher, a classroom teacher and a library media specialist in a local school collaborated in developing an integrated language arts/art unit. The unit provided activities for reinforcing and extending art and language skills based upon Brian Wildsmith's richly abstract picture books. His *The Rich Man and the Shoemaker* with its heavy use of color and shapes provided an excellent vehicle for reinforcing and discussing art concepts such as abstract/realistic, primary colors, geometric shapes, texture, pattern and placement which are concepts introduced in the school district's kindergarten and first grade art curriculum.

Children compared and contrasted the characters in the story, utilizing both text and illustrations. They hypothesized about theme and story elements, such as why a fierce dog appears in scenes with the rich man while shy kittens and a host of birds and animals flock to the poor man's home. After sharing several of Wildsmith's fables, children generated storylines with the help of the teacher and dictated their stories. An aide recorded the story for each child in booklet format. Children in small groups were provided with paper shapes (circles, squares and triangles) and paints to produce their art products. With the library media specialist, the children also sought out information about the illustrator to share with the class. The library media specialist added their books to a circulating collection of peer produced materials.

As educators concerned with the development of visual literacy skills, we should address methods and materials for providing quality visual arts experiences for our children as an integral part of the teaching/learning experience. Various specialists need to plan an integrated arts curriculum which brings to bear the combined skills of teachers, artists, parents and others committed to achieving goals and objectives in the visual arts for all our children.

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Layout as Political Expression: Visual Literacy and the Peruvian Press

Kevin G. Barnhurst

Newspaper layout and design studies ignore politics, and most studies of newspaper politics ignore visual design. News layout is generally thought to be a set of neutral, efficient practices. This study suggests that the political position of Peruvian newspapers parallels their visual presentation of terrorism. The liberal La República *covered events in the insurgency extensively and explicitly, as predicted. Conservative newspapers attempted to control terrorism by reducing the extent and limiting the prominence of coverage. One newspaper, the prestigious* El Comercio, *used layout as a primary tool to downplay news of Sendero Luminoso.*

Most studies of newspaper design treat layout as a set of professional practices that are essentially neutral (1, 2). Important news becomes a *big* story, a *headliner* or *banner* story, a *top* story, or a *front-page* story. These terms constitute the journalistic vocabulary of form, the equivalent of *sequence*, *direction*, and *scale* in the larger vocabulary of formal attributes from design. Layout correlates these attributes with news values, resulting in a visual record of what professionals, circumscribed by custom and procedure, judge to be news (3, 4).

This set of practices would go largely unexamined if not for two factors. The first is the tendency of journalists to dispute news judgments. Editors compare their layouts to the competition. When a particular story or subject matter gets consistently over- or underplayed, that coverage is considered sensational or biased (5). These charges assume that journalism should accurately reflect an objective reality. An alternative explanation, drawn from the theory of cultivation analysis, suggests that the media reinforce the dominant view of social reality (6). In this scheme, a charge of bias or sensationalism relies on its deviation from the dominant view, which is believed to be pervasive and persistent across society. The second factor is the tendency of layout practices to change over time. Editors promote new styles of layout by arguing for progress and efficiency. Academic research even reflects those arguments (7, 8, 9). The employment of newer typographic forms is taken as only natural and functional, and the change from traditional to modern tastes is taken as a sign of progress (10).

Just as studies of newspaper layout and design ignore politics, research on political violence and newspapers, for the most part, ignores visual design (11). Although newspapers

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are known to be political, economic, social, and cultural, these aspects are usually not thought to reside in layout practices. Newspapers are more commonly defined by their verbal content (12). The literature germane to this study typically ties the verbal content directly to politics without considering the visual play of the stories (13). For example, Epstein (14) found that the political stance of a newspaper was related to its verbal coverage of terrorism. The explicit mention of state terrorism was more frequent in the liberal *New York Times* than in more-conservative newspapers. But the study did not measure the visual play of the stories.

However, a few studies have attempted to examine the prominence given through visual presentation in newspapers (15). One study (16) compared the space allocated to terrorism coverage in two elite newspapers and defined the prominence of coverage by its position on the front page or in the upper half of the page. Another study (17) measured the length of the articles and their prominent location (on the first five pages of the first section, front of the second section, and first three pages of the magazine section), concluding that terrorist acts were prominently placed. These studies followed the pioneering work of Budd (18), who measured headline size and column width, story space and length, position on the section front or top half of the page, and inclusion of a picture to describe how the news was presented. Prominent news play, under Budd's definition, differed markedly from other news in the paper. Subsequent studies used Budd's method (more or less) to explore visual prominence, but this interest was secondary to verbal content in the study of political expression.

None of these studies connected the measures of visual emphasis to the political ideology of the newspaper, as Epstein (14) did. It seems that the more attention scholars pay to aspects of visual design the less they pay to the political context. This tendency reveals the presence of a common assumption: that layout is a neutral conduit of content. The error of this assumption may seem obvious, but its tacit and widespread acceptance in the literature requires rebuttal. The nuance of the visual form of newspapers requires exploration in the context of political expression.

A Study of Political Violence in Peru

This study begins with two questions. The first is whether the newspapers' political leanings relate to their visual design. Epstein's (14) findings suggest that liberal newspapers cover political violence more extensively and explicitly than do conservative newspapers. This question requires comparing a newspaper's political leanings with its visual presentation of content. The second question concerns whether differences in visual coverage relate to official layout policies. If the form or layout reflects the papers' political positions, then it becomes important to discover whether the differences result from explicit policy or unintentional pattern.

The setting for this study was the 1989 Peruvian Independence Day celebration, which was interrupted by the activities of Sendero Luminoso, a Maoist-style insurgency called the Shining Path. The specific aspects under study were, first, the political leanings of the national press; second, the visual record of their coverage of Sendero Luminoso, and third, the layout policies of newspaper executives.

Scholars have examined elsewhere the politics and history of the violence that wracked Peru in the 1980s (19). In 1989, the state of affairs in Lima was at extremes. The electrical grid was subject to frequent and lengthy blackouts. Potable water was cut off capriciously or was totally unavailable in some districts of the city. Police routinely stopped people in the streets and demanded proof of identity. Those without papers, along with anyone possessing "subversive" documents, could be arrested, only to vanish as ***desaparecidos.*** Few candidates had stepped forward to run for public office in the upcoming municipal elections, held every three years. These and other curtailments of civil liberties and public services demonstrated palpably the presence of Sendero Luminoso, which controlled several of the poorest provinces and besieged the capital. Yet Sendero Luminoso was largely ***invisible*** on the news stands.

Confronted daily by events that they considered terroristic (20), the newspapers in Peru made decisions that aligned them with the sides of a scholarly debate. The literature about terrorism and the press divides roughly into two camps (13). Some authorities argue that news coverage spreads terror and needs to be controlled. Others insist that the media are victimized by terrorists, that controlling coverage only penalizes the victims by damaging media credibility, and that control measures are ultimately ineffective. These camps can be characterized as conservative and liberal, although some conservatives forward a libertarian argument and some liberals urge controls (21). The Peruvian newspapers have taken sides in this debate, either attempting to control terrorism by voluntarily policing their own coverage of Sendero Luminoso, or attempting to report openly and extensively the events in the insurgency from a "patriotic" perspective. In this study, the term ***conservative*** refers to the former policy and the term ***liberal*** to the latter. All of the newspapers oppose Sendero Luminoso, but they use different oppositional strategies.

A central issue arising from events in Peru is whether the newspapers, knowingly or not, use ***layout*** as a tool for expressing their political stance on the question of the Sendero Luminoso insurgency. This study examines that issue from several perspectives.

METHODOLOGY

Five newspapers were selected to represent the national press. Peru is dominated by its capital city, whose residents have the saying, "Lima *is* Peru." Roughly a third of Peruvians live in the capital. Four newspapers dominate newspaper circulation in Lima: ***El Comercio*** (22 percent), ***Expreso*** (22 percent), ***La República*** (19 percent), and *Ojo* (17 percent) (22). These four accounted for 80 percent of the average sales in the capital, and they also dominated the national market. Three of them circulate in the provinces, and *Ojo* is the leading paper in a newspaper chain. None of the provincial newspapers has significant national circulation. Partisan newspapers run by the government and the ruling party accounted for another 12 percent of sales in Lima. The four major newspapers, along with one of the smaller partisan papers (*Hoy*) were selected for this study. These five are not meant to represent the entire industry (many small, radical newspapers, for example, are excluded), but they adequately portray the large and well-established national newspapers.

To provide a sense of the position of each newspaper along the political spectrum, knowledgeable informants were interviewed about the origins, political connections, and financial support of the study newspapers. The informants included two Peruvian journalism professors, two U.S. wire service correspondents covering the country, and the publishers of the four major independent newspapers. Four newspaper publishers also contributed impressions about their own papers as well as their competitors. The informants judged the politics of each newspaper ranging from left-leaning liberal to right-leaning conservative.

In order to compare the coverage of the same events in all five newspapers, a single day was selected for study (23). The particular day was chosen to cast Sendero Luminoso into sharp relief by capturing a major moment in the insurgency. Senderista attacks have generally occurred on or near July 28, the anniversary of San Martín's declaration of independence from Spain in 1821. The celebration of *Fiestas Patrias* lasts two days and coincides with the mid-year school recess. Senderistas have been known to seek greater attention by disrupting holidays, rather than work days (and the press likely gives them more attention on those days as well). In 1989 the holiday fell on a Friday, and Sendero Luminoso was expected to mount its attacks on or before that day. To allow time for transmission of news from the provinces, July 30 was selected for study. A Sunday was preferred because the newspapers have more space and greater freedom to include more stories, photographs, graphics, and articles of greater length and depth.

In order to identify the individual events under study, the content of the five newspapers was read and summarized, and each item was measured and classified as advertising or news-editorial material. The news-editorial content was further divided into three categories: news, opinion, and other articles including sports, features, entertainment, and pieces with no particular time value. The author also coded each article for whether it mentioned Sendero Luminoso explicitly, was related to the insurgency without mentioning Sendero Luminoso, or was clearly unrelated. Following the approach of Epstein (14), a list of terms used to refer to government and insurgent combatants was compiled for each newspaper.

The publisher of the newspapers were then interviewed individually, using a single set of questions (24) about their political stance on the insurgency and about their layout policies. These interviews were conducted in Spanish by the author with both the author and a native speaker taking notes. The results of these interviews are reported as a narrative about the interaction of government policies, professional journalism standards, and newspaper practices, as the publishers viewed them, in relation to coverage of Sendero Luminoso.

As a check on the claims of the publishers, the author then measured the layout of the newspapers on a full range of formal attributes, based on the analysis of form described in Barnhurst (25). Besides the space it occupied, each article was coded for whether it appeared on a front or inside page. It was also ranked for its position (from top to bottom) within the page and its headline size (from largest to smallest). The headline was further coded for the number of decks (multiple headlines appearing above the same story), the number of columns it filled (a measure of its width), and the sorts of emphasis found in its typography (boldface, italic, and/or condensed). The absence or number of pictures was noted, and the shapes (from simple rectangles to many-sided polygons) and orientations (horizontal, square, or vertical) of the text blocks and the article layouts were recorded.

These measurements clarified the standard or general layout pattern in each newspaper, sometimes called its *dress,* and also allowed scrutiny of how the layout of particular content — in this case terrorism — compares with the standard treatment of stories. Under the definition suggested by Budd (18) and others, particular coverage differing markedly from the standard would bias (when underplaying) or sensationalize (when overplaying) the news or, in the theory of cultivation analysis, might also signal the dominant view.

In sum, this study reports on the coverage of one day's Senderista attacks from several perspectives: the politics of the newspapers, their news that day, the culture of the newspaper publishers, and the visual results of their politics and policies.

THE NEWSPAPERS' POLITICAL POSITIONS

The politics of the newspapers were common knowledge, shared by informed nationals as well as foreigners (see Table 1). The political positions of the newspapers seem to be related to the nature of their reading public, their financial backing, and their historical development.

El Comercio, a 150-year-old institution controlled by several generations from the Miro Quesada family with the broad support of the industrial sector, occupies the position furthest to the right. Its readers tend to be older, in the upper classes, and male (26). *Ojo*, the popular tabloid founded in 1968 with close ties to the fishing industry, gets an almost identical rating. Its readership tends toward slightly older women, as well as younger men, both from the lower and lower-middle classes. *Expreso*, the serious tabloid connected to the populist Belaunde government but with weaker ties to commerce, is also right-leaning, but more moderate than the previous two. Its readers are more likely to be slightly younger men drawn from the lower-middle class. *La República* alone occupies a liberal position on the political spectrum. It began publishing in 1981 with strong liberal support and seed money from the energy sector. Its readership leans to younger men of the middle and upper classes.

Table 1. The Politics of Large Independent Peruvian Newspapers[a]

	La República	*Expreso*	*Ojo*[b]	*El Comercio*
PUBLISHERS				
La República	1.5	3.5	—	4.5
Expreso	2	3	4	5
Ojo	1	3	5	5
El Comercio	2	4	—	3
U.S. CORRESPONDENTS				
A	2	4	4	4
B	2	4	4	5
JOURNALISM PROFESSORS				
A	2	4	5	5
B	2	5	5	5
Mean	1.8	3.8	4.5	4.6
Standard Deviation	0.35	0.61	0.5	0.68

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[a] Based on interviews conducted in Lima, August 11–18, 1989. The publisher of *Hoy* and the professors each rated *Hoy* 3.

[b] The publishers of *El Comercio* and *La República* refused to rate *Ojo*. One wire correspondent said, "*Ojo* has no politics."

The publishers of *Expreso* and *El Comercio*, both of whom have strong ties with the U.S. press, placed themselves adamantly in the center, which may have skewed the sample, especially in the case of *El Comercio*. *Hoy* was not included in the ratings because it is a partisan organ founded as a tabloid in 1984 to support the centrist Aprista candidate. As a check on its stated politics, its publisher and the professors of journalism were asked to rate it separately. They uniformly placed it in the center, consonant with its party affiliation.

CONTENT COVERING SENDERO LUMINOSO

During the week of *Fiestas Patrias*, a Senderista strike against electrical towers could be known without reading a newspaper. On Friday, Saturday, and Sunday (and for almost a week thereafter) large sections of the capital were without electricity. By Sunday the blackout was old news, carried directly to homes and businesses over the electrical wires. *Ojo* and *El Comercio* reported on traffic and hospital electrical problems, but only *Expreso* tied the blackout to Sendero Luminoso and reported that terrorists had blown up 22 electrical towers.

Three stories related to terrorism dominated the Sunday papers. A great deal of coverage predictably went to the holiday parade, a showcase of military discipline and equipment which has been the object of repeated Senderista bombing attempts. The government also chose to disclose its claims that three anti-subversive actions had killed 110 Senderistas in the previous week. Finally, Sunday coverage included responses to the president's holiday address, in which he suggested that terrorists be prosecuted by the courts martial, not the civil judiciary.

A reading of the selected day's report on terrorism in Peru revealed individual patterns in reporting news content. The conservative tabloid *Ojo* and the partisan *Hoy* ignored terrorism beyond the two major stories. *El Comercio*, the most conservative newspaper with the most space, covered many stories about terrorism, but tended to bury them inside. The moderately conservative tabloid *Expreso* covered a broad range with shorter stories. *La República*, the liberal paper, covered terrorism more directly, with greater depth, opting to explain.

The newspapers' treatment of the three stories related to terrorism is an interesting gauge of their self-regulation. *El Comercio* and *Hoy* made no reference to terrorist threats in coverage of the parade. *Ojo* and *Expreso* dealt with parade security as directly related to the insurgency. *La República* left the parade story off page one, devoting space inside, in the local news pages, and covering the bombs and the arrests (of people distributing subversive literature during the parade) as explicit responses to terrorism, with pictures, on the center spread. *El Comercio* covered these security actions in a separate story on the police page.

Both *Ojo* and *El Comercio* gave relatively minor play to the anti-subversive actions. *Expreso* coverage was more prominent, and *La República* used a large headline and ran two pages with pictures of the funerals of slain police. While the other newspapers reported the actions uncritically, *La República* questioned the source:

> Mantilla [the minister of the interior] did not respond with greater detail, despite the demands of reporters, limiting his information to what the Joint Command had made known minutes before in a press release from the office of Public Relations (27).

The story about military courts was covered in several short items in *El Comercio* and *Expreso*. *Ojo* and *Hoy* ignored the story, but *La República* carried a group of items, including a survey of reader reaction to the speech (with a question about terrorism).

In other insurgency coverage, *El Comercio* ran the greatest range of items, including two exclusive stories. But these generally appeared with little detail on the police page. *Ojo* and *Hoy* carried no other terrorism articles, and *Expreso* had only two other small items. *La República* gave front-page play to the story of a woman claimed innocent who was killed by police, gave greater detail on Sendero vandalism, and had three long exclusives — on police action against Communist party members, a prisoner released by Sendero, and a reporter arrested under an anti-terrorism statute.

On the opinion pages, *El Comercio*, *Ojo*, *Expreso* and *Hoy* mentioned terrorism only in passing. *La República* ran a lengthy interview with the president, including four pages of detailed discussion and pictures of the insurgency, and the Sunday supplement devoted its cover story to terrorism in the altiplano and contained news of Senderista plans, opinion on the cause of the violence, and a notice about a media conference on terrorism.

Although their coverage of terrorism varied, the terms newspapers used to cover it were almost identical. To focus on the newspapers' rhetoric, direct quotation of sources were excluded from this list. Newspapers used ***terrorism***, ***subversion***, ***delinquency***, and ***sedition*** interchangeably with ***Sendero Luminoso*** (and their variants), and the quality of disapprobation was palpable. On the official side, ***anti-subversive***, ***security***, or ***force of order*** were used interchangeably for ***police***, ***army***, and ***military*** (and variants). Yet there were some differences. *El Comercio* used the term ***insurgent*** once and the modifier ***presumed*** twice to modify ***terrorist***. *La República* alone used the terms ***heroic soldiers*** (for government forces), ***accused terrorists***, and ***innocents*** (for non-combatants) These small distinctions in the reporting vocabulary hint at a studied neutrality in *El Comercio*, compared to the occasionally impassioned terms in *La República*.

These patterns of coverage relate to the newspapers' political ideology. Just as Epstein (14) predicted, the political positions of the newspapers were reflected in their treatment of terrorism, and especially of state terrorism. The conservative newspapers were not skeptical of official sources, did not report government violence, and buried disappearances inside the paper, deep within related stories. They also may have used more reserved terminology. The liberal newspaper did just the opposite, questioning official sources, reporting government violence, and presenting the news of the insurgency up front in the paper.

THE EXTENT OF TERRORISM CONTENT

The extent and openness of terrorism coverage also related to the newspapers' politics. Conservative newspapers limited their coverage, compared to the relative space used by the liberal paper. The amount of editorial space that all five newspapers dedicated to covering Sendero Luminoso exactly corresponded to their positions on the political spectrum. Position on the political spectrum was also a good predictor of the degree to which reporting tended to be frank or implicit. Conservative newspapers were less direct in their coverage, leaving the cause of many problems for the reader to surmise.

Because advertising occupied 51 percent of its 60-page broadsheet issue, the total news-editorial space of *El Comercio* was only slightly larger than that of *La República*, which ran 88 tabloid pages but had only 15 percent advertising (see Table 2). The tabloids *Ojo* and *Expreso* also had similar news-editorial "holes," almost a third the size of the other newspapers. *Expreso* was the slightly larger of the two, with 66 pages and 25 percent advertising. *Ojo* had 56 pages and 21 percent advertising. *Hoy* had 12 pages in its main, broadsheet section and a 16-page tabloid supplement and carried 11 percent advertising, most of it in the tabloid supplement section.

Among the five newspapers, news articles got the greatest share of non-advertising space in *El Comercio* and the least in *Ojo*. *La República* gave the greatest share to opinion, followed by *Expreso*. *Ojo* and *Hoy* dedicated the preponderance of non-advertising space (and *La República* the minimum) to things other than news.

Terrorism coverage occupied the majority of news space in *La República*. When it discussed terrorism, it was explicit, where *Expreso* covered many topics related to terrorism without saying so. When the total of terrorism news coverage, both explicit and implied, is considered together, the order of the newspapers matches their positions on the political spectrum. *El Comercio*, on the right, used 20 percent of its news space for terrorism, followed by *Ojo* (31.3 percent), and *Expreso* (44.6 percent). *La República* (57 percent), on the left, had almost three times the coverage of *El Comercio* and twice that of *Ojo*. The ong exception to this pattern was *Hoy* (17.2 percent), which for apparent partisan reasons devoted the smallest share of news space to terrorism.

Table 2. The Use of News-Editorial Space in Selected Peruvian Newspapers[a]

	La República	*Expreso*	*Hoy*	*Ojo*	*El Comercio*
NEWS	(23.7)	(22.9)	(26.6)	(13.7)	(31.2)
Terrorism	57.0	21.5	17.2	12.6	14.8
Implied	0.0	23.1	0.0	18.7	5.2
No relation	43.0	55.3	43.0	68.7	80.0
OPINION[b]	(46.3)	(39.4)	(22.1)	(2.3)	(25.1)
Terrorism	30.8	4.4	7.6	0.0	2.6
OTHER[c]	(29.9)	(37.7)	(51.3)	(84.0)	(43.7)
Total sq. in.	8378	6078	4812	6400	9268

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[a] By percentage, excluding advertising space. Figures in parentheses show the share of the total, others show the share within the category. All percentages do not add to 100 because of rounding.

[b] Opinion articles either mentioned terrorism or were unrelated to terrorism.

[c] No other coverage, including sports, features, entertainment, and articles with no particular time value, had any explicit or implied relationship to terrorism.

The use of opinion space also set *La República* apart from the group. Not only did it publish the greatest number of square inches of opinion, over one-third more space than *Expreso*, its nearest rival, but it gave almost a third of that space to topics in which terrorism was discussed directly. The other newspapers by comparison said nothing or next to nothing about their opinions of terrorism.

THE INTENTIONS OF NEWS EXECUTIVES

To discover whether the extent of coverage resulted from explicit guidelines and policies, the publishers of the five papers studied here were interviewed, August 16–18, 1989, about their coverage of terrorism. The publishers of the conservative newspapers — *Hoy*, *Ojo*, *Expreso*, and especially *El Comercio* — enunciated explicit rules of layout meant to limit or downplay the news of terrorism. Layout was a primary tool of control. But the publisher of the liberal *La República* claimed no special treatment for news of terrorism.

The publishers hinted at some efforts by the government to persuade them to play down terrorism. The publisher of *Ojo* said the idea of control had "come up three or four times" (28). But all the publishers declared complete independence from government.

One measure of their independence is their attitude toward the official version of terrorism. All the newspapers except *La República* publish only what official sources provide. The publisher of *Hoy* said, "In the case of terrorism, there is no investigative journalism" (29). But the publisher of *La República* said:

> *La República* confronts the government. I don't believe the press

> should be the conduit of the official version. We don't take the word of the police. We investigate and we discover what happened. . . . *La República* took a picture of [a man] when the police were taking him in. The next day he was found dead. Who will defend human rights? (30)

Although they are not controlled by the government, the media have instituted voluntary restraints. At a meeting in 1983, executives of newspapers, magazines, and television stations agreed to play down their coverage of terrorism. When interviewed, the newspaper publishers said their controls were essentially visual. *Expreso* policy was to put the news "down page" (31). *Ojo* banned terrorism from the front page. *El Comercio* had the most elaborate regulations. They "put it in back in the police section, like any other crime" (32). They also watched their use of adjectives, but they primarily used layout to discipline the stories on terrorism: reducing the size of the headlines, avoiding front-page pictures, and placing the story low on the page or inside. The publisher said *Hoy* adopted a similar policy of "self-control" in 1988.

La República was not present at the 1983 meeting, and in his interview the publisher of *El Comercio* charged *La República* with sensationalism. He said *La República* "used its absence to gain advantage." *La República* circulation increased 159 percent from 1988 to 1989 (33). Several of the publishers entered into recriminations, calling the coverage in *La República* sensational. The publisher of *La República* denied the charge of sensationalism and suggested that *El Comercio* and the other conservative newspapers biased the news toward the government.

THE VISUAL STYLE OF EACH NEWSPAPER

To consider these charges and counter charges, the general layout or design pattern first had to be identified for each newspaper. The measurements of most of the details of typography were very similar within each newspaper. The headline customs at the newspapers dictated a narrow range of variation in typography, and the body text was almost completely uniform in size and column width in each newspaper. Even the positioning of stories in the layout of pages, after the most important or top story, varied only a little. Apparently rigid rules of typographic and visual style, most of them imported from the United States, allowed very little variation in how individual articles were presented (34).

El Comercio, the largest newspaper, is a standard broadsheet with full color, extensive classified and display advertising, and the look of a medium-sized U.S. newspaper. As designed by a prominent U.S. newspaper consultant, it follows the general style of layout popular in the United States in the 1970s. Headlines run horizontally across several columns with a single deck. They are generally large and do not vary dramatically in size, and their typography is uniform, without emphatic italics, boldface, or all capitals. The columns of text also have horizontal layouts, in a comfortably large type size. The overall effect is spacious and tranquil, reflecting the style popular in the 1970s among small-city U.S. dailies.

The next largest newspaper, *Ojo*, is a tabloid that uses splashy color, runs the occasional scantily clad women, and fills almost half the typical issue with sports. Its model is the British popular tabloids of the 1950s and 60s. It is decorated with the circles and round-cornered boxes popular in that period, and has the brash headline typography and irregularly shaped text areas typical of what is called circus layout. The effect is lively if a bit crude or unpolished.

La República, the third largest paper, is an oversized tabloid with a red accent color on its type-only cover. Its design is magazine-like, with longer stories occupying full pages or spreads, similar to the intellectual weeklies that flourished in U.S. cities of the 1970s and 80s, such as the Boston ***Phoenix*** or the Chicago ***Reader***. These adapted the European format of ***Le Monde*** and ***El Pais***, without their classic typography. The style of ***La República*** invokes the fusion of the intellectual tradition of European newspapers with the American fashions of the seventies.

Expreso, the fourth largest paper, is a tabloid with a blue accent color on its cover. It crowds many short, national and international news stories under bold, condensed headlines, in a style reminiscent of 1940s serious tabloids, such as the Chicago ***Sun***. Vertical headline decks and bold, condensed typography predominate, and emphatic forms such as capitals and italics appear frequently. The columns of text are narrow and the body typography small, and text blocks include the doglegs common to what is known as brace or broken layout. These qualities align the newspaper with the hard-hitting and pithy design style known as traditional makeup, which emerged in San Francisco during the first World War.

Hoy changed to a broadsheet briefly in 1989 and used a red accent color on the cover of its single section. As a broadsheet, the newspaper imitated the horizontal layout and typography of *El Comercio*, although with less precision and professional polish.

VISUAL ANALYSIS OF TERRORISM NEWS

In order to check the claims of the publishers about their treatment of news about Sendero Luminoso, each newspaper's content was compared with its layout and design. The placement, story size, and use of pictures of the articles on terrorism were compared to those of the articles that were implicitly related or unrelated to terrorism. As might be expected in highly formatted newspapers, the layout and design was fairly constant, regardless of the editorial content. In *Ojo*, *Hoy*, *Expreso*, and especially ***La República***, layout position and story size followed the pre-set design style, not the particular terrorism content of the news. The use of pictures appeared to depend on some other factor (perhaps simple availability) also unconnected to terrorism. This finding is consonant with Budd's observation (18) that editors do not use pictures for emphasis.

Although the publishers of *Ojo* and *Expreso* also said they de-emphasized news of terrorism, the tendency was not evident on this particular day. Nor did a careful examination of the layout in ***La República*** reveal any visual exaggeration of the news of terrorism. The almost magazine-like style of ***La República*** appears to deal with news in a standardized layout that does not reflect content differences in the nuance of visual form.

El Comercio proved to be the exception. Almost one-quarter of its news coverage (15 of the 65 different news stories on the day studied) had some relation to terrorism. But of the 14 stories appearing on the front pages of news sections, only one related to terrorism. In *El Comercio*, terrorism articles are substantially underplayed when measured for the day under study. This finding was confirmed by the knowledgeable informants. "*El Comercio* has never put a terroristic act on is first page," said Silva (35). "It is evident that *El Comercio* has that standardized."

CONCLUSION

This study provides a documented case of a newspaper using layout to reflect intentionally its political position on a controversial topic. This result begins to rebut the assumption implicit in the literature that layout is a neutral conduit of content. It also calls into question the pattern of previous research, in which more attention to visual design goes hand in hand with less attention to political ideology. Visual design does appear to be a form of political expression. Layout may not only play a role at times in the rhetoric of news but also serve as a *primary* tool for imposing restrictive policies on political coverage. The newspaper publishers said they explicitly controlled the visual presentation but paid less attention to the other facets of reporting, writing, and editing the news of terrorism.

Under the theory of objectivity, *El Comercio* might be charged with bias for visually downplaying political violence. Likewise, *La República* might be charged with sensationalism for dedicating so large a share of its news hole to the insurgency. The arbiter of these charges would be some measure of an external, objective reality. That measurement is beyond the scope of this study. Critical scholars might consider such the measurement impossible to obtain, but that does not mean that some reasonable approximation should not be the focus of further study.

The alternative is to define the position cultivated by *El Comercio* along with the majority of newspapers circulated in Peru as the dominant view, from which *La República* deviated. But only 11 percent of the adult population of Lima read newspapers (36). In outlying barrios of the city, as many as 7 percent of voters say they support Sendero Luminoso (37). The view of the newspaper publishers does not appear to be dominant, that is, pervasive and persistent across social classes and communities as required in the theory of cultivation analysis.

However, the example of the press in Peru has other implications for the field of visual communication. What was startling in the political violence in Peru of the 1980s was the evident calm of the daily press. The visual appearance of these newspapers stood in dramatic contrast with the social disarray of the other systems in the national infrastructure. *El Comercio*, one of the oldest newspapers in the Americas, was a sea of tranquility. Even the liberal *La República* did not *look* especially shrill in its typographic cover. As this study indicates, the newspapers in Peru are highly formatted, and the treatment each paper gives to the variety of news is fairly constant. The sources for these formats can be traced to specific designers and design movements in the United States. The style of *El Comercio* invoked the peace and stability of small-town North America in the 1970s. The style of *La República* mimicked intellectual U.S. tabloids of the same period. The Peruvian press accepted these designs as efficient and functional, without regard to their historic and political origin. However useful for the U.S. and European markets of their periods, these styles did not reflect the upheaval in Peru.

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12. Kevin G. Barnhurst, "The Great American Newspaper," ***American Scholar*** 60 (Winter 1991): 106–112.

13. For a summary of the field, see Kevin G. Barnhurst, "The Literature of Terrorism: Implications for Visual Communications" in ***Media Coverage of Terrorism: Methods of Diffusion*** ed. A. Odasuo Alali and Kenoye Kelvin Eke (Newbury Park: Sage, 1991), pp. 112–137. See also, Robert G. Picard and Paul D. Adams, "Characterizations of Acts and Perpetrators of Political Violence in Three Elite U.S. Daily Newspapers," pp. 12–22.

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15. Maxwell McCombs and Sheldon Gilbert, "News Influence on our Pictures of the World," in ***Perspectives on Media Effects*** ed. Jennings Bryant and Dolf Zillmann (Hillsdale: Lawrence Erlbaum, 1986), p. 7.

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17. David L. Paletz, Peter A. Fozzard, and John Z. Ayanian, "The IRA, the Red Brigades, and the FALN in ***The New York Times***," ***Journal of Communication*** 32 (Spring 1982): 162–171.

18. Richard W. Budd, "Attention Score: A Device for Measuring News 'Play'," ***Journalism Quarterly*** 41 (Spring 1964): 259–262.

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20. Most definitions of terrorism include three aspects: ***communicative acts*** involving ***violence or menace*** to serve a ***political purpose.*** For the most thorough review of definitions on the

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21. One study recommended *requiring* media coverage and access. Alex P. Schmid and Janny de Graaf, *Violence as Communication* (London: Sage, 1982).

22. All figures are from Datum Research Service, "Periódicos y Revistas," Study No. 2, Lima, Peru, September 1988.

23. The first of several quantitative studies of a single day was by Wilbur Schramm, ed., *One Day in the World's Press* (Stanford: Stanford University Press, 1959). Qualitative work of a single day springs from the notion in the work of Michel Foucault, who fixes on a central, defining episode and documents it closely in order to approximate a panoptic view. See Michel Foucault, *Discipline and Punish* (New York: Pantheon, 1977).

24. James P. Spradley, *The Ethnographic Interview* (New York: Holt, Rinehard & Winston, 1979).

25. Kevin G. Barnhurst, "News As Art," *Journalism Monographs* 130 (December 1991).

26. In this section, demographic information is from Datum (Note 22), and historic, political, and commercial ties are from informant interviews, especially Silva (Note 34).

27. *La República*, July 30, 1989, p. 3

28. Fernando Viaña V., publisher of *Ojo*, telephone interview with the author, August 18, 1989.

29. Luis Alberto Guerrero U., publisher of *Hoy*, interview with the author, August 16, 1989.

30. Alejandro Sakuda M., publisher of *La República*, interview with the author, August 17, 1989.

31. Dr. Manuel d'Ornellas, publisher of *Expreso*, interview with the author, August 17, 1989.

32. Alejandro Miro Quesada G., publisher of *El Comercio*, interview with the author, August 17, 1989.

33. From Datum (Note 22, p. 260), verified by Sakuda (Note 30).

34. Major design styles are described elsewhere, see Note 24 and Kevin G. Barnhurst, "Interpreting Layout," in *Seeing the Newspaper* (New York: St. Martin's Press, 1994).

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The Appearance of Change in *Fried Green Tomatoes*

Gretchen Bisplinghoff

In the current digital age of instant information, consumers encode and decode computer languages and symbols of electronic communication. They become aware of the translation process necessary to access this new form of expression. Learning the translation process can establish a heightened awareness of the process of selection and interpretation involved in coding these particular messages. Understanding the nature and use of symbolic messages is vitally important for today's consumers of information, particularly the messages of the mass media. However, in daily interaction with mass media images, this process of encoding and decoding a representation of the world is consistently overlooked precisely because the visual images look "real"; look like their referents. Also, constructions within media such as film guide interpretation of messages; internal structures often establish guidelines for "correct" translation of messages for audience consumption. The film in effect pre-digests the material for the audience; the resulting filmic conclusions seem natural and inevitable. An examination of key symbols and structures of a recent Hollywood film, FRIED GREEN TOMATOES, reveals the nature of the coding process and its effects.

FRIED GREEN TOMATOES depicts parallel stories of female friendship. The growing relationship between Evelyn Couch and Ninny Threadgoode mirrors that of Ruth Jameson and Idgie Threadgoode, as it is presented in Ninny's stories of the past. Both sets of female friendships are shown to be empowering; however, it is also clear that the film's structure and visual strategies work to translate and define the meaning of that empowerment. The present day characters and their relationship acts as translation/application for today's viewers, particularly female viewers. The parallel tales feature the characters of Idgie and Ninny as the catalysts, while Ruth and Evelyn reflect the changes that the relationship brings about. However, the depiction of Evelyn's transformation, the application of the film's message for today, is presented so that the character embodies and reflects a carefully constructed change based on a much narrower interpretation of the power of female friendship. The movie focuses particularly on Evelyn's change in appearance as a visual metaphor for the changes she is experiencing as a result of her friendship with Ninny. The audience's understanding of the meaning of Idgie and Ruth's friendship and its impact in Evelyn's life is conveyed primarily through changes in her costume, make-up, hair, body image and relation to food.

Idgie and Ruth are both young, slim, beautiful women who come to care deeply for each other—care enough to defy the rigid conventions of small town Southern life in the Thirties. Ninny's presentation of their story in the film filters out the lesbian love clearly set forth in the book, translating it to "friendship." Idgie's unconventional lifestyle is primarily displayed throughout by her costuming. From her young tomboy days on, she is depicted in "male" outfits—suits with short knicker pants, overalls, etc. She is shown as fearless and aggressive, whether braving the danger of wild bees or rescuing Ruth from an abusive marriage. Ruth and Idgie together build a business and raise a family outside of the "normal" societal definition of marriage and family. Together they support themselves by running the successful Whistle Stop Cafe (where the specialties of the house are barbeque and fried green tomatoes). This visual presentation of an unconventional lifestyle; a different but successful lifestyle between two women, is translated through Ninny's connection with Evelyn primarily by her successfully redesigning her appearance according to prevailing societal standards of attractive.

A MARY KAY MAKE-OVER

In the present, Evelyn's empowerment and the impact of Ninny's tales primarily focus on change in Evelyn's personal appearance; in her presentation of herself and her image. Evelyn is the "initially downtrodden and miserable fatty"[1] who gets a "make-over" in the course of the film. She's an overweight "middle-aged frump"[2] who's fallen into a "menopausal funk."[3] Through the course of the film her weight remains the same but she learns to package it in a more societally acceptable presentation to an audience conditioned to images re-enforcing the message that only "thin is beautiful." During three-fourths of the film her weight is exaggerated by her costuming. Her clothes are designed to enhance the perception of her weight through the use of bright primary colors (such as red) for her dresses with features such as wide white lace collars and "wrap around" or Empire line styles that accentuate her size. Often she wears dresses with very large floral patterns—always against a white background—which are accented by large accessories such as sling bag purses and heavy gold jewelry. Her hair is a massive mop of uncontrolled reddish-gold curls which accents the width of her face. Her make-up colors also emphasize bright red lipsticks and dark eye liner and lash coloration.

In the final scenes of the film, when she comes to the nursing home for the last time, her appearance has been transformed. As she gets out of her car, the audience is cued by a shot of the logo on the rear window of the pink car that she is now a Mary Kay cosmetics representative, although this has never been mentioned and we never see her working at this job at any time in the film. Shortly before, at the immediately preceding visit, Evelyn told Ninny that her influence had caused Evelyn to look in a mirror and she didn't like what she saw so she "changed." As she steps from the car we see the tangible results of her decision. She wears a pastel pink, tailored suit with a straight skirt and an off-white tailored blouse which is accented by a single strand of pearls, high heels and a small navy clutch purse on a thin shoulder strap. Her hair has been straightened and subdued into a smooth "page boy" which curls under at chin level to lengthen the line of her face. Her make-up is also subdued to current, more fashionable "natural" shades of brown eye make-up and pink shades for blusher and lipstick. She has obviously learned to apply Mary Kay techniques.

The other tangible results of Evelyn's change are her refusal to give up a parking place without a fight and her announcement to Ed that she's taking Ninny in to live with them whether he approves or not (re-enforcing message to the growing numbers of women who, as part of the "sandwich" generation, are taking responsibility both for caring for children and caring for aging parents). However, the clear message of the application of change for the viewer lies in the emphasis on the visual change in Evelyn's appearance—to a more "tasteful," "fashionable" controlled "look" defined by conventional standards—not on growth as a person of worth and intellect. That this is the central thrust of the film's interpretation is no more clearly illustrated than by the Mary Kay Cosmetics commercial which opens the rental cassette version—all female viewers are offered a free "make-over" and lipstick simply by calling the Mary Kay 800 number appearing on the screen.

FOOD AS LANGUAGE

Throughout the film, images of food are central in guiding interpretation of the film's message; food operates as a visual symbol on many levels both private and public. As Naomi Wolf points out; ". . . within the context of the intimate family, food is love, and memory, and language . . . in the public realm, food is status and honor. Food is the primal symbol of social worth."[4] Food operates as bonding between individuals and generations. However, there are wider implications of the use and presentation of food in the past which has been transformed for the present. Food in the past is shown being used first as a powerful means of independence for Idgie and Ruth and then as part of an altruistic, empowering contribution within society. The implications of this power are filtered through the present day application of Evelyn's use of food as individual control of her life through control over her body—reinforcement of a message that has been taken to heart by millions of American girls and women who obsess about food and eating to the point of starvation: "Compulsiveness about the food we eat and the bodies we put it into has turned eating disorders into a national epidemic."[5]

Evelyn Couch's first appearance onscreen in the opening scenes of the film immediately defines the source/solution to her problems—her relationship with food. This scene also establishes the connection of past and present through food and reflects the change in the message from public to private. The first shot of Evelyn frames her in medium close-up through the passenger side car window. As the camera slowly closes in on her face, she begins to unwrap and eat a candy bar while staring out the window. A cut away reveals to the audience what she is staring at—the now deserted, dilapidated Whistle Stop Cafe. More importantly, the camera is focused tightly in on and reading down the bill of fare of rich desserts and specialty items of the cafe with Evelyn—homemade fruit pies and cobblers, fried green tomatoes, etc. She stares enraptured, eating her candy bar, as the noises of a ghost train from the past move down the tracks in a swirl of leaves. Past and present connect through the evocation of the food of the time.

FOOD AS LOVE

Both sets of friends are shown bonding through images of food. Idgie and Ruth run a cafe and are intimately connected to the preparation and presentation of food. Key moments in their relationship are demonstrated through food as visual language. During their initial "courtship" Idgie and Ruth go on a picnic. The camera pans across the picnic foods laid out on a blanket before tilting up to the seated couple. Idgie then rises; the camera follows her as she goes across the meadow to get a special gift for Ruth—wild honey. She returns to Ruth (who is astonished and emotionally overcome by her bravery) covered with wild bees and bearing a jar of golden liquid. Later in the film, after Idgie has rescued the pregnant Ruth from Frank and they have established themselves in the restaurant, their lives together are demonstrated through a series of "still lifes" of food and then the use of that food in a food fight. Individual shots of baskets of perfect, lusciously ripe fruits and vegetables, as well as bowls of eggs, cake frosting and a pan of frying tomatoes are shown in a montage sequence that lingers on their beauty of form and evocation of memory. Idgie and Ruth, however, then use these foodstuffs in a goodnatured physical expression of their relationship; picking up handfuls of berries, flour, etc., and throwing or squishing them on the other. The constable who comes in to see what the commotion is about and threatens to arrest them receives a spatula of frosting down his face and the front of his shirt (delivered slowly and deliberately in extreme close-up).

FOOD AS SOCIAL WORTH

However, as this run-in with the law demonstrates, there are wider implications for the use of food within Ruth and Idgie's lives. Food equals independence and freedom for Ruth and Idgie. Their ability with food makes their independent lifestyle possible and also quite literally delivers them from their oppressor, Ruth's ex-husband Frank, who continues to threaten them through the KKK. When Frank tries to kidnap his son, he instead becomes part of the specialty of the house. The alliance of women, Blacks and dispossessed of the diner come together to defeat Frank. Immediately after Frank "disappears" there is a close-up shot of meat on the chopping block as a new batch of BBQ is being prepared—and then served to the law enforcement officers who come looking for Frank. Ruth and Idgie's use of food connects with, and makes a difference in, the social fabric of the times. They employ Blacks to prepare the BBQ; more importantly to the townspeople, they feed them out of the cafe and recognize them the same as they do the whites of town. Together they also feed "tramps," the dispossessed of the Depression, like Smokey Joe. His rehabilitation starts with a close-up of a huge plate of food on the counter, which is followed by a tilt up to a medium close-up of his upper body and face as he tries to get his drink-ravaged body to accept their gift. One of Idgie and Ruth's first acts as a couple involved hopping a freight and throwing canned goods off the train to the people of shanty towns along the tracks.

Evelyn and Ninny are also shown connecting through food; in this case, the gifts of food that Evelyn brings and shares with Ninny. Again, this focus is much narrower. Food is an ever-present part of Evelyn's costume—she constantly carries candy, doughnuts, crackerjacks, etc, as presents for others at the nursing home and for herself. The opening images are repeated throughout of Evelyn constantly eating—she shares what she brings with Ninny and what she eats changes—but she's still eating obsessively. Ninny accepts the candy and sweets, but can't handle the food of change, the "rabbit food," as it gives her gas. Evelyn's marital relationship also is presented in terms of the food she offers her husband. She tries unsuccessfully to get his attention with platters of fried chicken and crown roasts; she follows him to the television clutching an armful of beers. A difference in their food-based relationship is signaled initially by a close-up of a skimpy plate of greens and vegetables which he refuses to accept as his dinner.

Thus images of an unconventional life outside of marriage are defused and translated into very conventional images within marriage. Public activism becomes private consumerism. Love, courage and rebellion become a Mary Kay infomercial.

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[1] John Simon, "Tenors, Tomatoes, and a Turkey," The National Review, 44 (March 30, 1992), 45.

[2] David Ehrenstine, "Fried Green Tomatoes caps a banner year for delesbianization," The Advocate (February 11, 1992), 67.

[3] Ibid.

[4] Naomi Wolf, The Beauty Myth (New York: William Morrow and Company, 1991), 189.

[5] Roberta Seid, Never Too Thin (New York: Prentice Hall Press, 1989), 21.

Editor's Note:

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